Proceedings of the

American Association of Textile Chemists and Colorists

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SEPTEMBER 24, 1956

AATCC Calendar

COUNCIL
Nov 16, Jan 18 (New York); Mar 29 (Roanoke, Va); June 7 (New York)

NATIONAL CONVENTIONS
Nov 14-16, 1957 (Hotel Statler, Boston); 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, D C)

MID-WEST SECTION
October 27, February 16 (Hotel Bismarck, Chicago, Ill)

NEW YORK SECTION
Oct 19, Nov 16 (Kohler's Swiss Chalet, Rochelle Park, NJ); Jan 23, Mar 1 (Hotel Delmonico, New York, NY); Apr 26, May 24 —ladies nite (Kohler's Swiss Chalet, Rochelle Park, NJ); June (Annual Outing)

NIAGARA FRONTIER SECTION
Oct 13 (joint meeting with CATCC at Hamilton, Ont); Nov 2 (Buffalo, NY); Nov 17 (joint ladies night with CATCC) at Hamilton, Ont); Dec 7, Jan 11, Mar 15 (Buffalo, NY); Apr 5 (joint meeting with CATCC at Kitchener, Ont)

NORTHERN NEW ENGLAND SECTION
Sept 28 (Annual Outing—Wachusett Country Club, West Boylston, Mass); Oct 19 (Science Park, Boston, Mass); Dec 1 (Annual Meeting—Hotel Vendome, Boston)

PACIFIC SOUTHWEST SECTION
Oct 12-13 (Outing—The Inn, Rancho Santa Fe, Calif)

PHILADELPHIA SECTION
Sept 28 (Abraham Lincoln Hotel, Reading, Pa); Nov 2 (Drake Hotel, Philadelphia, Pa); Dec 7 (Kugler's Restaurant, Philadelphia, Pa)

PIEDMONT SECTION
Oct 6 (Annual Meeting—Hotel Charlotte, N C)

RHODE ISLAND SECTION
Oct 18 (Johnson's Hummocks Grille); Dec 6 (Annual Meeting, Johnson's Hummocks Grille)

SOUTH CENTRAL SECTION
Dec 1 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION
Dec 8 (Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
Oct 5 (Annual Meeting—Hartford, Conn); Nov 16 (Rapp's Restaurant, Shelton, Conn)

NOTICE

PERKIN CENTENNIAL COVERAGE

WE regret that printing schedules did not allow for extended coverage of the Perkin Centennial in this issue. A comprehensive summary of Centennial highlights will appear in the October 8th issue.

This issue of the AMERICAN DYESTUFF REPORTER, however, carries the following:

1) Photographic coverage of exhibits, AATCC Annual Banquet, Olney Medal Award, and Intersectional Contest speakers.
2) "Current Developments in Colorfastness Testing in the USA." by Charles A Sylvester.
3) "Legacies of William Henry Perkin and 19th Century Science," by Gen Anthony C McAuliffe.
4) "1956 ADR Award to Fred Fortess."
5) International Day highlights.

PIEDMONT SECTION WINS INTERSECTIONAL CONTEST

THE Piedmont Section's entry, "Effect of Resin Finishes on Light Fastness of Vat Dyes," was judged the winner of the 1956 Intersectional Contest, which was held on September 15th in the Grand Ballroom of the Waldorf-Astoria Hotel.

Earle D McLeod, Arnold, Hoffman & Co, Inc, chairman of the Contest, who made the announcement during the Annual Banquet of AATCC on the evening of the 15th, also announced that 2nd place had gone to the Washington Section, and 3rd place to the Rhode Island Section, for their respective papers "A Study of the Scorching Characteristics of Fabrics" and "An Investigation of Roller Printing on Wool."

More complete details on the Contest will appear in the October 8th issue.

(Photos of speakers appear on page P725 of this issue.)

AN ADR SERVICE at the Perkin Centennial. Group is shown looking over a message board adjacent to the Registration Desk. Clara Patrick (standing) and Bertha Fousek (seated) were among Howes Publishing Co personnel who attended the Registrant Locator Desk.

Perkin Centennial———

INTERNATIONAL DAY

The Perkin Centennial, under the sponsorship of the American Association of Textile Chemists and Colorists, began appropriately on September 10th, 1956 with an international flavor, as twenty-six technical, chemical, and scientific societies joined to pay tribute to Sir William Henry Perkin, who created "mauve," the first synthetic dye, 100 years ago.

Sir Robert Robinson, Nobel Prize winner for chemistry, professor emeritus of Oxford University and a director of the Shell Chemical Company, Ltd, delivered the principal address of International Day opening the Perkin Centennial, at the luncheon session held on the Starlight Roof of The Waldorf-Astoria.

Crawford H Greenewalt, president, E I du Pont de Nemours and Co, introduced Sir Robert. Co-sponsors of International Day were the American Standards Association and the International Organization for Standardization.

The Perkin Medal of the British Society of Dyers and Colourists was presented at the luncheon by Clifford Paine, president of the Society, to Mrs Carothers on behalf of her late husband, Dr Wallace H Carothers, pioneer in the research leading to the discovery of nylon.

H Thomas Hallowell, Jr, president, American Standards Association and president of Standard Pressed Steel Company, presided at the luncheon.

The morning session of International Day, co-sponsored by AATCC and ASTM, brought speakers from Canada, France, Germany, Switzerland, and the United Kingdom. They described the latest developments in colorfastness testing in their countries. Charles A Sylvester, chairman of the Technical Committee on Research of the American Association of Textile Chemists and Colorists, discussed current developments in the United States (see page P719) and presided. William D Appel, of the National Bureau of Standards, was moderator.

An International Day afternoon panel session on the impact of man-made colors on commerce and industry in the United States featured these speakers:

Harry L Dalton, vice chairman of the board, American Viscose Corporation; Robert Bingman, chief stylist in charge of colors and fabrics, Chrysler Corporation; Miss Willie Mae Rogers, director of the Good Housekeeping Institute; Jackson E Spears, vice president, Burlington Industries, Inc; John E Reeves, president, Reeves Brothers, Inc; Joseph Knapp, president, Fox-Knapp Manufacturing Company; Kenneth H Klipstein, general manager, Research Division, American Cyanamid Company.

Also Albert Kner, color consultant and chief designer, Container Corporation of America; George Stuhr, sales manager, Southern Craft Division, International Paper Company; L K Merrill, vice president, Bakelite Company, Division of Union Carbide and Carbon Corporation; Philip M Talbott, senior vice president, Woodward and Lothrop, and president, National Retail Dry Goods Association; Arthur S Johnson, vice president, American Mutual Liability Insurance Company, and chairman of the ASA Standards Council; Mrs Dorothy Liebes, textile designer and colorist; Robert A Seidel, executive vice president, Radio Corporation of America; and John A Cairns, president, Anderson and Cairns, Inc.

Guest panelists from other countries included: Werner Kunz, Heberlein and Company, Switzerland; J W Eaton, The T Eaton Company, Ltd, Canada; and Clifford Paine of England.

Chairman of the afternoon meeting was Charles W Dorn, chairman, Executive Committee on Research of the American Association of Textile Chemists and Colorists. J Robert Bonnar, sales manager, Dyestuffs and Pigments Div, General Dyestuff Company, served as moderator. Leonard S Little, textile consultant, was chairman of the International Day Committee.

PRINCIPALS, INTERNATIONAL DAY MORNING SESSION—*Seated (l to r)*: William D Appel, National Bureau of Standards, moderator; J P Niederhauser, CFMC, France, speaker; Paul Rabe, Farbenfabriken Bayer AG, Germany, speaker; M L Staples, Ontario Research Foundation, Canada, speaker. *Standing (l to r)*: P W Cunliffe, British Cotton and Wool Dyers Assoc, United Kingdom, speaker; Fritz Buxtorf, Sandoz, Ltd, Switzerland, speaker; Raymond W Jacoby, president, AATCC, who delivered the welcoming address; Charles A Sylvester, E I du Pont de Nemours & Co, Inc, USA, speaker and presiding official.

PRINCIPALS, INTERNATIONAL DAY LUNCHEON—*(L to r)*: Crawford H Greenewalt, E I du Pont de Nemours & Co, Inc, who introduced the guest speaker; Mrs Carothers, widow of Dr Wallace H Carothers, who was honored posthumously; Clifford Paine, president, Society of Dyers and Colourists; Sir Robert Robinson, principal speaker.

Perkin Centennial
International Day—

CURRENT DEVELOPMENTS IN COLORFASTNESS TESTING IN THE USA*

CHARLES A SYLVESTER

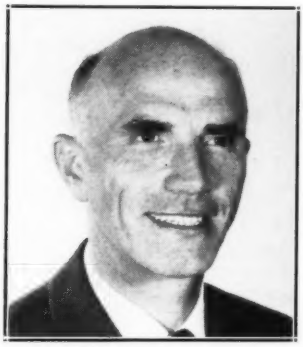
Chairman, Technical Committee on Research, AATCC

Head, Dye Properties Division, Technical Laboratory, E I du Pont de Nemours & Company, Inc, Wilmington, Del

THE discovery of the first synthetic dye by William Henry Perkin one hundred years ago acted as a stimulus toward the development and subsequent growth of many new industries. It opened up broad horizons to the dye chemist and the advances made in the field of synthetic dyes during the past century are most significant. These have been reflected in the progress shown by the textile industry during this period. The availability of several thousand dyes possessing definite characteristics and properties, improved processing techniques, and the creation of new and unique fibers have all contributed toward the production of attractive and serviceable fabrics capable of meeting more end-use requirements.

Through education and the trend toward better quality, the consumer has become both careful and critical in his buying habits. —He has learned to expect an even exchange in values for the money expended and he wants to feel assured that any claims made by the manufacturer on a given article can be substantiated by factual data that will insure satisfactory performance. This is exactly what different industries are striving for. The chemical and dye manufacturer, the mill processor, the converter, wholesaler, and retailer are all directly concerned with meeting the critical demands of the consumer. The success of this Nation's economy has been built upon this principle.

Insofar as textiles are concerned, the importance of colorfastness and its interpretation cannot be overestimated. There are dyes that provide fastness commensurate with the end-use requirements of a given fabric. Test methods have been developed that accurately predict the degree of colorfastness that can be expected from these dyes under actual use conditions.



CHARLES A SYLVESTER

The paper discusses recent trends in the development and improvement of test methods by the American Association of Textile Chemists and Colorists. It points up the emphasis that is being accorded to the development of colorfastness tests designed to predict end-use performance. It stresses the effort that is being made to utilize mechanical apparatus in test methods to promote optimum consistency and reduce to a minimum the human factor. The Crockmeter, FDA-R Fade-Ometer, Launder-Ometer, Perspirometer, and stainless steel tubes are mentioned as means of accomplishing this objective.

Since its inception in 1921, the American Association of Textile Chemists and Colorists has had as one of its principal objectives the development of test methods for evaluating colorfastness. You are all familiar with the merited position of authority held by the Association in this field. Because of this position, its test methods are becoming more and more an integral part of the realistic colorfastness specifications being written by the industry. The American Standards Association released in 1952, L-22 American Standard Minimum Requirements for Rayon and Acetate Fabrics, sponsored by the National Retail Drygoods Association. Under this same sponsor, they are currently working on American Standard Minimum Requirements for all Textiles, which will be incorporated in L-22. American Standard Minimum Requirements for Institutional Textiles, L-24, sponsored by the American Hotel Association, was released this year. These standards are mentioned as illustrations of the importance of end-use performance tests in the United States. It should be emphasized that the AATCC has nothing to do with establishing standards or setting specifications or tolerances in the industry. It only develops test methods. These tests utilize mechanical apparatus whenever practical to reduce to a minimum the human factor and the resulting inconsistencies.

A good starting point for discussing new colorfastness testing developments in the United States is with the more scientifically accurate procedures for determining colorfastness to washing.

The *AATCC Technical Manual and Year Book* contains two series of widely used wash tests—the old numbers 1, 2, 3, and 4, and the newly developed series identified as Accelerated Washfastness Tests 2A, 3A, and 4A. For many years, the old tests established in the 1930's were accepted tests for evaluating washfastness. However, changes in methods of home and commercial laundering, especially with new types of washing equipment, have shown that, in most cases, the old tests are too mild for

*Presented during "International Day", September 10, 1956 during the Perkin Centennial at the Waldorf-Astoria Hotel, New York, NY

accurately predicting colorfastness. Around 1945, the Washfastness Committee initiated work to develop a series of accelerated tests that would more realistically and accurately predict the color loss and abrasive action resulting from washing conditions varying from hand to vigorous mechanical washing with chlorine. These tests were among the first end-use performance tests. It required approximately six years to set up the first accelerated test, Accelerated Washfastness Test 3A. To develop this test, the Research Subcommittee on Colorfastness to Washing organized a comprehensive program. Forty-one different materials were selected as representative of those likely to be washed frequently. Samples of them were subjected to 30 successive washings by 11 commerical launderies and to a similar number of washings in home laundry equipment under eight different sets of conditions. Two-yard samples of each fabric were used with swatches being removed after 1, 5, 10, 15, 20, 25, and 30 launderings. A number of supplementary tests were made. Some idea of the magnitude of the program can be gained from the fact that more than 4,000 yards of material involving more than 15,000 individual swatches were used in the tests. To evaluate the tests, over 25,000 gradings were required.

The completion of this program provided the necessary background for the development of a laboratory test. The average amount of color removed in commercial and home laundering equipment tests was established statistically. This median of color loss was used by the Association's research staff as a reference standard in developing a laboratory test to correlate with the results of actual laundering. The test method that was finally adopted, after an exhaustive series of interlaboratory tests, specifies a temperature of 160°F. It approximates the color loss and abrasive action resulting from 5 average commercial or home launderings without chlorine. This median value for color removal was produced by 5 commercial launderings at 120°F using a wash solution of moderate alkalinity and a running time of one hour for each washing cycle. A similar amount of color removal was obtained by 5 launderings in an electric home washer using a moderately alkaline built soap and a temperature of 140°F. The accelerated tests are run in the Launder-Ometer; however, to provide the required mechanical action, it was necessary to design a special stainless steel tube 3½" x 8" to replace the glass jars used for the old 1, 2, 3, and 4 series of wash tests.

This same type care was exercised in developing the other accelerated wash tests which undoubtedly explains why the criticism of these tests, since their introduction, has been practically nil.

For the 4A test, the median amount of color removal was established by subjecting a series of appropriately dyed fabrics to white-work washing formulas in several laundries. The washing formulas were run at a maximum temperature of 160°F and the fabrics bleached using 2 quarts of one percent available chlorine bleach per 100 pound load, the quantity specified by the American Institute of Laundering.

The 2A test was developed from the color washdown results obtained on a range of appropriately dyed fabrics which were laundry washed at 100°F with neutral soap.

The accelerated washfastness tests are what the name implies. They are end-use tests designed to produce in 45 minutes the amount of color loss which would normally be removed by five consecutive average commercial or home launderings. The three tests were set up irrespective of fiber and they correlate well with the results from the three types of washing formulas generally used in commercial and home laundering. A comprehensive series of laboratory tests have indicated that the use of either anionic or nonionic detergents in place of the neutral soap specified has no significant effect on the severity of the tests. The presence or absence of optical brighteners does not appear to be a pertinent factor.

The Colorfastness to Washing Committee is actively working on tests to show the effect of light exposure followed by washing. The practical end-use aspects of such tests must be readily apparent as most colored fabrics are exposed to light before washing.

Another area of end-use testing that is receiving a great deal of attention is drycleaning. The existing methods of testing colorfastness to drycleaning have been satisfactory for evaluating the purely chemical effects of solvent on colors. It has been found, however, that the abrasive action of mechanical agitation on textiles in commercial drycleaning machines is not adequately reflected in these tests. This is particularly true with pigment colors, metallic finishes, and overprinting in general.

The Committee on Dry Cleaning Test Methods has been investigating a test which reflects both the chemical and abrasive conditions of commercial drycleaning, utilizing the same equipment as in the accelerated washfastness tests. The test has been undergoing laboratory application for several months under practical conditions with marked success. Certain aberrations in its application have been uncovered, however, which are being studied. It is hoped that a final recommendation will be made for its adoption by AATCC at an early date.

In developing this test, two major changes in drycleaning practice in the US have been taken into account. One is the greatly expanded use of perchlorethylene and the other, the development of "charged system" techniques incorporating water and detergents in dry cleaning solvents. This new system has virtually eliminated the need of drycleaners to use wetcleaning methods on heavily soiled fabrics. The new test, therefore, will not include a wet procedure as in the present methods. Other simplifications are being considered also in the interests of both economy of laboratory application and correlation with end-use.

Another test method that has been the subject of considerable research over the past few years has been "Colorfastness to Light." The research committee, with the assistance of a resarch associate, is currently working on a project initiated seven years ago for investigating the conditions that cause and affect the fading of textiles exposed to daylight and to artificial light. The project is sponsored jointly by the AATCC and Atlas Electric Devices Company. The natural light phase of the investigation has included comparisons of fading from exposure to direct sunlight, sunlight under window glass using glass of three different thicknesses, automobile safety glass, and plastic covers that filter out the shorter wavelength sunlight rays.

A series of comprehensive sunlight tests has been made under glass using American Standard single strength window glass, 0.085 to 0.1 inch thickness, that transmits a minimum of 77.0% of the ultraviolet, 90% illuminant "C" (average daylight) and 85.0% total radiation. The tests include the following comparative exposures:

a) fading when the test specimens are exposed at 1, 2, and 3 inches beneath the glass.
b) fading when the test specimens are attached to white and to black cardboard and to bleached

white cotton and to silk and wool.

c) fading when the test specimens are exposed beneath plastic covers that filter out wavelength rays shorter than 390 millimicrons.

d) fading when the test specimens are exposed between 9:00 AM and 3:00 PM, between 3:00 PM and 9:00 AM and for 24 hours of continuous exposure.

e) fading when test specimens are exposed in well ventilated cabinets with fading in tightly closed cabinets.

f) fading in cabinets when the test specimens are exposed in a horizontal position with fading when the samples are exposed at 30, 45, 60, and 90 degrees from the horizontal position.

g) fading in cabinets with the test specimens exposed 30 degrees from the horizontal position facing magnetic north, east, south, and west. Also fading in the same directions, but with the samples exposed at 90 degrees from the horizontal position.

In addition, considerable work has been done investigating the effect of heat and humidity on the rate and character of fade resulting from exposures to both natural and artificial light. A conservative estimate is that the study has included over 10,000 tests.

Progressive results of this thorough and comprehensive investigation of the factors involved in colorfastness to light generally indicate that:

1) The character of fade is similar in both direct sunlight and sunlight under glass. The few exceptions are among those dyes with less than Class 4 lightfastness.
2) Fading occurs at a much more rapid rate in direct sunlight than in sunlight under glass.
3) Increasing the thickness of the window glass from approximately .1 inch to .25 inch thickness decreases the rate of fade, but does not affect the character of the fade.
4) Test specimens exposed 1 inch beneath the glass fade faster than when exposed at a distance of 3 inches from the glass; however, the character of the fade is constant.
5) The use of black or white cardboard, white cotton, silk, or wool as backing for the test specimens has little or no effect on the rate or character of fade.
6) The rate and character of fade is similar in cabinets facing magnetic east, south, and west. It is much slower in cabinets facing magnetic north.
7) There is no significant difference in either the rate or character of fade in sunlight under glass tests between samples exposed in a horizontal position and those exposed at angles of 30 and 45 degrees from the horizontal. However, as the angle is increased beyond 45 degrees, the rate of fading decreases.
8) The rate of fading in a tightly closed cabinet is faster, in most cases, than in a well ventilated cabinet. Black panel temperatures as high as 220°F have been recorded in bright summer sunlight, one inch under the glass in tightly closed cabinets in Salem, New Jersey.
9) Some dyeings show considerable fading when exposed to sunlight under plastic covers that filter out sunlight rays whose wavelengths are shorter than 390 millimicrons.
10) Fading is not limited to exposure between the hours of 9:00 AM and 3:00 PM, but also occurs in lesser degree between 3:00 PM and 9:00 AM.

The many tests that have been made in sunlight and in the Fade-Ometer on both the old and new man-made fibers have demonstrated that, in most cases, variations in temperature, especially above 150°F, exert more influence on fading than do variations in humidity between 20 and 50 percent. The most rapid rate of fading is obtained with black panel temperatures above 150°F with relative humidities of over 50 percent.

The policy of utilizing mechanical equipment for testing, whenever possible, has already been stressed. This includes the Fade-Ometer, a carbon arc lamp, for evaluating lightfastness. It is recognized that some dyes exhibit a lower degree of fastness when tested in the Fade-Ometer than they do when exposed to natural light; however, the character of the fade is usually the same. The American Textile Industry has found it expedient to use the Fade-Ometer for the following sound reasons:

1) The Fade-Ometer is readily available and is not subject to the vagaries of nature.
2) The Fade-Ometer has proved to be, in most cases, a satisfactory medium for evaluating lightfastness in terms of consumer performance.
3) Because of the rigid schedules that are maintained in the production of season shades and fashion requirements, there is, in general, not sufficient time for exposing samples in natural light.
4) Some dyes fade more rapidly in the moist air of the coastal regions than they do in the drier air of the interior states. There are some dyes that are sensitive to atmospheric contaminants that prevail in certain areas. Since the manufacturer does not usually know where the textiles he manufactures will be used, it is important for him to have a standard test method for consistency in an over-all picture of lightfastness. He has found that the Fade-Ometer serves this purpose well.

It is important, however, to operate the Fade-Ometer correctly. Recent changes in the standard carbon arc method for evaluating lightfastness specify that—

a) a black panel thermometer must be used to establish the air temperature within the lamp.
b) the black panel temperature within the lamp should be maintained at 145° ± 5°F and the ambient relative humidity between 30 and 40 percent.

It is also important that the fading rate of the lamps in testing laboratories be adjusted to the recognized standard rate by use of the light-sensitive paper developed for the purpose by the National Bureau of Standards in cooperation with the AATCC.

Tests under way do not indicate that the "Fugitometer" eliminates anomalous fading. The rate of fading in this equipment is much slower than in the Fade-Ometer which, from an American viewpoint is an undesirable feature. This is also true of the "Zenon" lamp, which, in addition, appears to have some operational hazards.

An interesting investigation is being conducted by a Colorfastness to Light Subcommittee which involves a system being used by some segments of the textile industry for evaluating fastness to light. The test method being investigated consists of exposing dyed specimens without blue standards by a daylight procedure, and crediting time for those periods when the solar intensity exceeds 0.823 gram calories per square centimeter per minute. Three questionable points are

(concluded on page P730)

Perkin Centennial———

PERKIN CENTENNIAL EXHIBITS

Three rooms on the ballroom floor of the Waldorf Astoria during the Centennial were devoted to exhibits, primarily of an educational nature. In the Astor Gallery was an exhibit sponsored by the manufacturers of organic colors, "A More Colorful World". Against the historical background of man's attempt to color materials with natural dyes, this demonstrated the properties of modern dyes and their uses in industry, fashion and the home. Illustrating the varied uses were colorful globe settings showing the many different materials that are enhanced in beauty and otherwise made more appealing through color. These included textile fibers, paper, leather, plastics, film, petroleum products, paints, etc. On the side walls were other exhibits, some in the form of dioramas, depicting different industries and the many products that have grown out of dye research and that have become available in commercial quantities. Some of these industries are pharmaceuticals, agricultural chemicals, plastics, synthetic rubber, petroleum products and photographic chemicals.

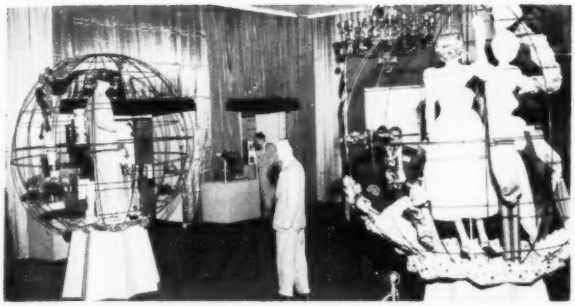
In the Jade Room the manufacturers of fibers and fabrics displayed the whole range of present-day colors and fabrics for every requirement, and in the Basildon Room companion exhibits displayed the variety of finishes that are available to improve the serviceability and increase the value of fabrics, both natural and synthetic.

In an area beside the entrance to the Grand Ballroom was a special exhibit featuring colorfastness, testing equipment and methods developed for the benefit of the consumer and the industry by the American Association of Textile Chemists and Colorists.

In ceremonies opening the exhibits on Tuesday, September 11, AATCC President Raymond W Jacoby is shown cutting the ribbon. He was aided by (l to r) Henry L Young, Interchemical Corp, exhibits chairman; Leon P Brick, Onyx Oil & Chemical Co; George P Paine, executive secretary, AATCC; Robert W Hamilton, General Aniline & Film Corp, printing chairman; and Henry F Herrmann, Vat Dye Institute, treasurer of the Perkin Centennial Executive Committee.

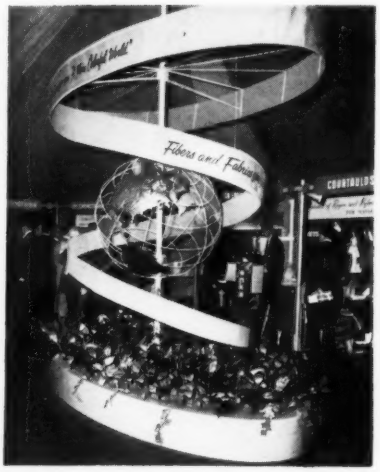
The entrance to "A More Colorful World" portrayed the sources of natural dyestuffs upon which man was dependent prior to Perkin's discovery.

PERKIN CENTENNIAL EXHIBITS



"A More Colorful World"—Astor Gallery

"Functional Finishes"—Basildon Room



"Fibers and Fabrics"—Jade Room

"A More Colorful World"—Astor Gallery

"Fibers and Fabrics"—Jade Room

AATCC Exhibit—East Ballroom

Perkin Centennial———

1956 OLNEY MEDAL AWARD TO WALTER J HAMBURGER

WALTER J HAMBURGER, director and treasurer of Fabric Research Laboratories, Inc, Dedham, Mass, became the thirteenth recipient of the Olney Medal, AATCC's highest award, on Thursday, September 13th, at the Olney Medal Luncheon held in the Grand Ballroom of the Waldorf-Astoria Hotel, New York, during the week of the Perkin Centennial.

Presentation of the Medal was made by AATCC President Raymond W Jacoby, with Henry F Herrmann, Vat Dye Institute, presiding.

Prof Edward R Schwarz of Massachusetts Institute of Technology, winner of the Olney Medal in 1947, and a classmate of Dr Hamburger, discussed "The Medalist".

(A complete presentation of the proceedings of the Olney Medal Luncheon will appear shortly.)

The Olney Medal

Dr Hamburger (right) receives the Olney Medal from President Jacoby

Dr E R Schwarz delivering his address, "The Medalist"

Dr Hamburger delivering the address of the Medalist

Head Table (l to r): Edward R Schwarz, Olney Medalist, 1947; Raymond W Jacoby, president, AATCC; Henry F Herrmann, past president of AATCC, presiding official; Walter J Hamburger, Olney Medalist, 1956; Werner von Bergen, Olney Medalist, 1952; Charles A Seibert, Olney Medalist, 1949

Perkin Centennial———

1956 AATCC INTERSECTIONAL CONTEST SPEAKERS

Paul B Stam, Piedmont Section—"Effect of Resin Finishes on Light Fastness of Vat Dyes

Nelson F Getchell, Washington Section —"A Study of the Scorching Characteristics of Fabrics"

C Eric Neale, Rhode Island Section— "An Investigation of Roller Printing on Wool"

Rita Landry, Pacific Southwest Section —"The Effect of Smog on Textile Material in Los Angeles"

W J Mohr, South Central Section— "The Effect upon Shade Matching from the Use of Different Latex Formulations with Selected Dyestuff Classifications"

William S Sollenberger, Philadelphia Section — "Cationic Softeners — Their Secondary Effects on Textile Fabrics"

Edgar E Lineken, New York Section— "The Application of Electrical Instruments for Measuring Moisture Content of Textiles"

Perkin Centennial
AATCC Annual Banquet———

LEGACIES OF WILLIAM HENRY PERKIN AND 19TH CENTURY SCIENCE*

GENERAL ANTHONY C McAULIFFE, U S Army (Ret)
General manager, Engineering and Construction Division
American Cyanamid Co
New York, NY

MISTER Toastmaster, members of the American Association of Textile Chemists and Colorists, Ladies and Gentlemen:

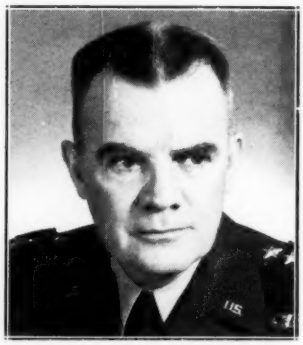
I feel honored that so soon after my entry into the chemical industry I have been invited to address one of the industry's most distinguished organizations. I also welcome the opportunity afforded me here tonight to meet so many of you who will be my colleagues in the months and years ahead.

I must confess to you that I had another motive—aside from respect and good fellowship—in quickly accepting the generous invitation to be with you this evening. I felt that it was necessary to make it clear, at the very outset of my career in the chemical field, that I have been known to speak in words of more than one syllable—and that I can carry on a discussion of longer than one word duration.

Let me assure you, however, that in my anxiety to prove my point I do not plan to deliver an oration. I think we shall hear many of them between now and November, and that all of us need to save our critical faculties for the great quadrennial task and privilege of sifting fact from fancy, and reality from promise, in the verbal harvest we are about to reap.

Tonight marks the closing of a week of celebration marking the one hundredth anniversary of William Henry Perkin's great and dramatic discovery and subsequent production of the world's first synthetic dye—an achievement that along with the development of steam power, electricity and steel was one of the most important technological advances of the nineteenth century.

*Address delivered by Gen McAuliffe at the Annual Banquet of AATCC at the Waldorf-Astoria Hotel, New York, NY, on Saturday evening, September 15, 1956, climaxing the week-long celebration of the Perkin Centennial.



GENERAL A C McAULIFFE

I propose to speak briefly this evening about some of the legacies left to us by William Henry Perkin and his fellow scientific pioneers of the nineteenth century—legacies that do not always include new products and sales statistics, but which perhaps have a deeper meaning for us in the problem-ridden world of the twentieth century.

It has always interested me that such a great accumulation of man's scientific experience and curiosity, of his experimentation and invention, seems to have suddenly been catalyzed within the span of a single century, and advanced mankind further in the mastery of his environment than in the thousands of years preceding.

As one scholar stated it: "The greatest invention of the nineteenth century was the invention of the method of invention." And that is where I feel the emphasis tonight should be placed on Perkin's work, and that of his contemporaries. They left us, in addition to a body of facts and a list of compounds and products, a *method* which we could use not only to unlock the secrets of the universe, but to help us analyze and solve problems of political, social and spiritual meaning.

It seems quite clear that humanity had been going through a period of slow and careful preparation for the time when gifted minds would begin to draw aside the heavy curtains that stood between man and understanding of the universe he inhabited.

William Henry Perkin came upon the world's stage when scientific ferment and intellectual curiosity were at an all-time high. The Ages of Reason and Enlightenment had just passed and the soil had been fertilized for even greater achievements of the human mind.

The Nineteenth Century was the "Age of Science" — a period that marked the transformation of civilization more dramatically than had ever happened before. The young William Henry Perkin stood shoulder to shoulder, both as a contemporary and forever in history, with such incomparable geniuses as Mendeleev, Joule, Volta, Faraday, Curie, Pasteur, Roentgen, and others who through their scientific observations and hypotheses changed irrevocably the course of human destiny.

Yet — and it is to his everlasting credit — young Perkin went beyond the realm of pure science, because of his faith in his discovery and his conviction of its usefulness. He plunged into the risky business of manufacturing and marketing his dye, almost single-handedly taking on the job of developer, producer, marketing specialist, advertiser, salesman and general entrepreneur.

When the eighteen-year-old Perkin had his wonderful "accident" — the creation of the first synthetic dye while he was trying to synthesize quinine — he could not know, nor could the most farsighted scientist have known, that the results of his discovery would ring down through history with an ever-increasing echo. The effects of this major scientific breakthrough were to multiply and

increase with virtually every new application.

In the United States today, we find a vast and diversified organic chemicals industry which is the direct descendant of the dark-colored precipitate Perkin found in a test tube on that fateful day in 1856. The industry employs over 300,000 people and its yearly product is valued at more than four billion dollars. The annual payroll of approximately one billion dollars adds an important increment to the national income and wealth.

The dye industry itself, an essential part of the greater synthetic organics field, is of great significance in almost every aspect of our lives, as this Perkin Centennial has dramatically pointed out.

We almost had a tragic lesson in the importance of a strong dye and organic chemicals industry during the first World War. Although Perkin had pioneered the discovery, production and marketing of synthetic dyes, German scientists and industrialists had capitalized upon and extended his work far beyond their English and American competitors. At the outbreak of World War I, therefore, America found itself facing the threat of war with only the barest minimum available in technique and resources to produce the explosives, dyes and drugs necessary to protect its interests.

The United States resolved never again to be in this position, and after the end of the war, industry and government alike were committed to a policy of establishing a strong and independent source of chemicals within our own borders. How effectively this was done is one of the miracles of modern science and technology. It is almost impossible today to think of a manufacturing process in this vast industrial establishment of ours that does not depend upon synthetic organic chemicals at one state or another, even if the finished product does not show them.

Every consumer today is directly experiencing the presence of synthetic organics in the clothes he wears, the medicine that keeps him well, the food he eats, the automobile he drives, the television set he watches, and the airplane that carries him at home or abroad.

The millions of children who have just returned to school carry plastic school bags, drink their milk from coated containers, use brightly dyed papers in their art classes and—we hope—brush their teeth with toothpaste. In all of these every-day activities, the presence of the synthetic organic chemical is the common denominator.

At home, at work, at play—in peace and in war—in the factory and on the farm—the destiny and way of life of the American people are inseparably bound with the influence and contributions of this great industry. We are today safer, healthier, better clothed and fed, more prosperous and have brighter prospects, both as individuals and as a nation, because of the imagination and enterprise of an eighteen-year-old English schoolboy and his successors in the development of the synthetic organics field.

It is not stretching a point, then, to include William Henry Perkin with such inventive giants of his century as Alfred Nobel, Thomas Edison, George Westinghouse, Rudolf Diesel, and Alexander Graham Bell, to name but a few of the builders of the new civilization, who made the technology of the 19th century the springboard for a new epoch in the history of man.

And yet it is not wholly fair to Perkin that we are inclined to think of him about exclusively in terms of his aniline purple, or mauve as it became universally known. Although he later discovered and developed many dyes of various beautiful shades, he was, at heart, a scientist who wished to pursue "truth for the sake of truth." So, at the age of thirty-five he sold his business so that he could devote his life to pure research.

That he was outstandingly successful and made many more contributions to science is well known to every student and worker in chemistry today. For example, he was the first to synthesize coumarin, which led to the founding of the synthetic perfume industry, and his method for the formation of aromatic unsaturated acids is known down to this day in chemical practice and literature as "Perkin's Synthesis."

His greatest later contribution to chemical science, however, was in the field of magnetic rotation. On the occasion of the fiftieth anniversary of the discovery of aniline purple, a great celebration was held in his honor, at the climax of which he was knighted by his sovereign. One of the orators at these events, speaking of Perkin's work on magnetic rotation, said: "Before you began work, there was little, almost nothing, known of this subject. You created a new branch of science . . ."

As we review the life and contribution of this remarkable scientist, we do not wonder that a great celebration marked the one hundredth anniversary of his birth in 1938, when the chemical societies of the world united to do homage to his work and his memory, as we have done here in this past week. It is clear that in the opinion of his contemporaries, and in the verdict of history, Sir William Henry Perkin has been judged one of the great chemists of all time.

And yet, I have wondered and asked myself this question. Are these tangibles—these products and processes—all that we can trace back to Perkin, or can we dig a little deeper and find perhaps other legacies which are useful to us in this complicated and changing world of the mid-twentieth century?

As I suggested a few minutes ago, Perkin did not stand alone as a great figure in science in the nineteenth century. He was the historical companion of some of the most outstanding creative intellects of Western civilization, and with them participated in the development of a scientific method of investigation that was to give man an undreamed-of mastery over his physical environment.

These men of science challenged all knowledge and beliefs about the physical world—as the philosophers of the preceding centuries had challenged the concepts of the medieval thinkers. Out of these conflicts between the old and the new came new insight and new ideas, some of which are a part of our lives today, and others of which have vanished. Daring and imaginative thinkers like Marx, Darwin and Freud seemed to strike at the very foundations of oldest traditions, and western civilization was forced to review its positions, to develop new strengths, to correct and remedy weaknesses, to bring its thinking into harmony with the realities of new knowledge and needs, and, in short, to engage in continuing self-appraisal and adjustment.

It became necessary to be dynamic in order to survive. We learned our lessons well and in time. We used to great advantage some of the methods bequeathed to us by the scientific and philosophic geniuses of the past.

My recent experience in Europe as Commander of the United States Army on that continent have convinced me that these legacies of the nineteenth century — the intellectual independence and the capacity to re-examine our opinions and to apply the unfettered methods of scientific inquiry to our problems, share in importance and significance the unquestioned technological benefactions which the great minds of that century bequeathed us.

Because we gained proof in the past

of Nations was able a generation later to be one of the most zealous founders of the United Nations.

The strength of America—and the free world—derives from our democratic institutions, whose ideals are declared in the Bill of Rights and the Constitution of the United States, as well as in the constitutional documents of the democratic nations of the world.

This strength, however, received nutrition and direction from the imaginative and creative efforts of the scientists, philosophers, scholars, and inventors of the past who were unwilling to believe that all knowledge had been received, all truth unfolded and the status quo was the ideal for future generations. The William Henry Perkins, the Faradays and the Pasteurs cried out to the world, in effect—"No, no—the best is yet to come."

The world today is standing at a crossroad, around which a fierce war is being waged for men's loyalties. Ideas are the ammunition of this war, and the political and social actions of men are the weapons.

In the past few years, we have witnessed a complete reversal of Soviet tactics. The furtive, truculent, suspicious, hostile Soviet man of the Stalin era has been buried under an avalanche of joviality and a tidal wave of vodka.

We are confronted with one of the greatest "New Look" in history. Like many "looks" it does not go much deeper than the surface, but nevertheless it has been remarkably effective in creating good impressions and promoting favorable opinions.

Unfortunately, many of our friends seem to be accepting the "New Look" at its face value.

This is the greatest challenge to face the United States and the other free nations in our time.

Surrounded by such danger, we can be grateful for the legacy of resourcefulness that has been ours since the days of the settlement and conquest of this great continent. This sense of individualism and independence, nourished by the spirit of free inquiry and experimentation of the past two or three centuries, has strengthened our resources and made them equal to the job.

Tonight, as we climax the centennial celebration of William Henry Perkin's century, to an extent that we never had learned before, that we did not possess final and complete knowledge about everything, we have been able to remain dynamic and progressive. We have been able to develop new tactics and strategy as new problems confronted us, but always within the framework of our basic dedication to the ideals of human dignity and integrity.

It is here that one of the essential differences between the Soviets and ourselves becomes more apparent. They have the ability—with complete cynicism and opportunism — to shift *ideals* as well as tactics, as long as they are serving the ultimate objective of international Communism.

There is nothing more important in the world today than the capacity of the free nations to meet the changing tactics of Communism with imagination and enterprise. We have seen how well the Communists have learned the lesson of reappraisal and self-examination. When they buried Stalin, a man who was almost psychotic in his rigidity of attitude, they buried with him the folly of unchanging and unyielding positions where many human affairs are concerned. The free world is now paying the price for the rediscovered Soviet flexibility in tactics, if not in purpose.

The history of the United States since World War II is a good example of flexibility of position, in the best of senses. Dedicated to peace as an article of faith in our free democracy, we did not hesitate to go to war in Korea when it became clear that this was the only thing we could do, if our freedoms were to endure and to have any meaning.

With our forces weakened in Europe through demobilization, and our policy based on the avoidance of anything that might provoke open conflict with Russia or might imperil the uneasy peace, we nevertheless ran the blockade of Berlin.

Although weary of high taxes, the American taxpayer has time and again voiced approval of the vast assistance programs which have helped to rehabilitate countries tottering on the brink of Communism.

As a final example of our flexibility, we can cite the present-day commitment of the United States to active participation in the affairs of the world-wide community of nations, in contrast to the isolationism of the years between the two World Wars. The nation that rejected the League great contribution to science, industry and civilization, we recall to mind the host of scientists and philosophers who, with him, made the nineteenth century so significant in the history of human achievement.

We are grateful that this English youngster possessed the imagination, the critical understanding and the courage to develop and advance his great discovery. If we are to draw lessons from the past—and I assume that is one of the purposes of this week-long appraisal and commemoration of Perkin's work, we might also reflect briefly upon the qualities of the man himself. If we, as individuals, confronted our problems with Perkin's kind of imagination and understanding, if we planned and executed our solutions with his versatility and resolve, if we subjected our actions and those of others to his kind of searching study, we might discover that many of our problems are not problems at all. They are merely new facts in new situations, awaiting analysis and a reasonable course of action.

Unfortunately, the modern world has been made complicated by the very advances of science and technology which have brought it so many benefits. A bewildering complex of values, interests and relationships compete for attention and solution. If we bring to them the spirit, the methods and the insights that are among our most valuable inheritances from the past, we shall be using in fullest measure the legacy left to us by William Henry Perkin and his fellows of the Age of Science.

To their unquestioned achievements in science and technology we shall have added that dimension of the intellect and the spirit which is, after all is said and done, what made them giants and set them apart from their fellow men.

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

56-11

Education: Lowell Tech Institute — graduated 1931 BTC — Chemistry & dyeing.
Experience: Supt dyeing & finishing—natural and synthetic fibers.
Age: 48; married; references; South preferred; position in supervision of dyeing & finishing, development, or research desired.

AATCC Annual Banquet———

1956 ADR AWARD TO FRED FORTESS

The presentation of the sixth annual AMERICAN DYESTUFF REPORTER Award was made to Fred Fortess, Celanese Corporation of America, at the Annual Banquet of the AATCC at the Waldorf-Astoria Hotel, New York, NY, on Saturday evening, September 15, 1956, during the week-long Perkin Centennial celebration.

The Award, presented by Dr Walter M Scott, chairman of the AATCC Publications Committee, was for the paper "Dyeing, Finishing, and Heat-Treating Arnel Triacetate," which was presented by Mr Fortess before the New York Section on April 22, 1955 at Kohler's Swiss Chalet, Rochelle Park, NJ, and which was published in the August 1, 1955 issue of the REPORTER.

Fred Fortess was born in Antwerp, Belgium, and grew up and was educated in Chicago, receiving his BS degree at the University of Chicago in 1935 where he continued graduate studies in physical-organic chemistry. His first publication resulted from graduate research work in the absorption spectra of Europium ions in solution.

Mr Fortess joined the Research Laboratories of Universal Oil Products Company in 1937 in the field of catalytic reactions of petroleum hydrocarbons. He later joined the Celanese Corporation of America in 1942 at their Cumberland, Maryland textile fiber producing plant where the original nucleus of the Celanese research and technical department was formed. His first responsibility with Celanese was concerned with the catalytic dehydration of butanediols as part of the butadiene-synthetic rubber program. This resulted in several patents.

Mr Fortess' first direct contact with the textile industry involved the development of yarn and fiber processing lubricating oils. He later became section head of the Textile Lubricating and Sizing Research Group. When Celanese consolidated its Textile and Plastic Research Department in 1947 at their Central Research Laboratories in Summit, New Jersey, he and a large number of scientists and technicians moved to this site.

The chemical problems related to fabric finishing soon attracted his attention and resulted in a number of technical papers, the most significant of which were concerned with the properties and application of the silicone durable finishes.

Walter M Scott, chairman of the Publications Committee, presents check to Fred Fortess, 1956 winner of the American Dyestuff Reporter Award, during the Annual Banquet of AATCC, September 15, 1956

The development by Celanese of Arnel triacetate as a major textile fiber increased the importance of the dyeing and finishing technical activities and Mr Fortess became head of a consolidated section concerned with fabric processing. It was the technical development and applications work on this group which provided the data and principles for the paper on Arnel which won the ADR Award.

Recently Mr Fortess was appointed manager of the Dyeing and Finishing Laboratories of the Applications and Product Development Department of the Marketing Department of the Textile Division of Celanese. He and a large staff of experienced textile scientists will work out of the modern plant just completed at Charlotte, North Carolina.

Mr Fortess considers education as his main hobby and found time during the course of his professional career to assist the State of Michigan to set up an experimental school where he taught the physical and biological sciences at the high school level, especially adapted to rural communities. He also taught college chemistry as part of Pennsylvania State University's extension program. This interest has carried over into Parent Teachers Association work which is made possible by his daughters June and Janet. His interest in mineralogy and mineral collecting is shared by his wife, Ethel.

Judges for this year's contest, appointed by the AATCC Publications Committee, were: R W Joeger, Franklin Process Co, *chairman;* R B Stehle, Allegheny Dye Works; and H C Borghetty, Rohm & Haas Co.

The Award was endowed by the Howes Publishing Company as a memorial to Alfred P Howes, founder of the AMERICAN DYESTUFF REPORTER. Its purpose is to encourage the presentation of the best possible papers before local and national meetings of the Association. The Award, $200 annually, is presented to the author or authors of the paper considered best in the opinion of the judges. Any technical paper presented before a local or national meeting of the AATCC and published in the *Proceedings* as they appear in the AMERICAN DYESTUFF REPORTER is eligible with the follow-

ing exceptions: Intersectional Contest papers, papers by employees of the AATCC, reports of work substantially subsidized by AATCC, or reports of research committees. It is a condition of eligibility that the paper have its first publication in the *Proceedings*. Papers published in the *Proceedings* from July 1st of one year to June 30th of the next year are considered in each judging period.

Details of previous ADR Award winners appeared on page P619 of the August 27th (Perkin Centennial) issue of the REPORTER.

Colorfastness Testing——

(*concluded from page P721*)

immediately obvious to those skilled in the finer points of sun testing, ie,

1) The rating is based on hours of exposure without any calibration from blue standards simultaneously exposed.
2) The assumption is made that no significant fading occurs below 0.823 gram calories per square centimeter, the so-called "erythemal limit" below which sunburn of the skin is not likely to occur.
3) The assumption is made that the rate of fading does not vary appreciably at different intensities above 0.823 gram.

The data in the committee's hands clearly indicate that Point No. 2 is based on a completely false assumption, ie, significant fading does occur below 0.823 gram calories per sq cm. This point alone explains why the procedure in question has led to erratic results, incorrect judging of colorfastness, misconceptions as to the severity of fading in Florida as compared with other localities in the United States, and misconceptions as to the relationships between sun fastness and Fade-Ometer fastness on specific specimens. Radically different degrees of fading are obtained by this procedure, for the same number of credited hours of exposure when the weather is predominately clear or cloudy, being understandably more severe in cloudy weather when a fair part of the total radiation received is below 0.823 gram calories per sq cm.

With reference to Point No. 3, the Atlas Electric Devices Company cooperated with the committee by setting up four test frames equipped with shutters automatically opened at a desired level of sun intensity and closing at a desired higher level. Instruments automatically recorded the *langleys* received at each level of intensity. (A langley unit is one gram calorie per square centimeter; thus it is a product of solar intensity and time, a quantity of radiation determined by pyrheliometers, and suitable recording and integrating apparatus.) Tests were conducted at four levels of intensity, ie,

0.1 to 0.823 gram calories per sq cm
0.823 to 1.0 gram calories per sq cm
1.0 to 1.2 gram calories per sq cm
1.2 and above gram calories per sq cm

Results indicated that fading occurs at all levels, increasing fairly linearly with intensity and that regardless of the intensity range equal amounts of radiation (langley/min) produce comparable fading. While this work proved that fading occurs below the level of 0.823 gm/cal/cm^2, it was decided to determine if there is some level of intensity below 0.823 at which no appreciable fading occurs. To accomplish this, tests are now in progress at the following four levels.

0.1 to 0.4 gram calories per sq cm
0.4 to 0.6 gram calories per sq cm
0.6 to 0.823 gram calories per sq cm
0.823 and above gram calories per sq cm

The results to date have encouraged the committee to investigate the possibility that a completely new test procedure can be developed based on the total amount of radiation (langleys/min) required to produce a specific amount of color change. If this can be accomplished, sunlight testing will be more complicated in that instrumentation will be involved. However, coupled with a daylight procedure, the test would be considerably more convenient and results would be obtained in much less time than now possible with the "Sun" procedure. The latter point is particularly important in the testing of very fast specimens. Present blue standards would still be required as the primary standards necessary for calibration and correlation with the suggested method when instrumentation is not available.

Another point should be made for those interested in international standardization of test methods. Before a single lightfastness test method acceptable in all countries is likely to be agreed upon, the long established differences in practice will have to be studied further. These include the use of different series of dyed standards, different conditions of exposure to sunlight and daylight, use of fading lamps, and differences in the amount of fading on which classification of fastness is based. A common method would be most helpful to textile technologists generally and to chemists and dyers in areas such as South America where shade cards of both European and American dye manufacturers are used. Work is in progress in the US and in the other countries to try to correlate ratings in the various systems. Such correlations probably will have to be used for some time because the industry in each country has too large an investment in its existing methods to change overnight. However, earnest efforts are being made in the ISO to resolve this situation.

The efforts of the AATCC to utilize mechanical apparatus whenever practical in their test methods have resulted also in the development of the following test equipment.

1) The Perspirometer, which insures uniform and reproducible pressure on test specimens subjected to perspiration and water tests.
2) The Crockmeter, which is a standard instrument for determining color mark-off.
3) The Accelerotor, which is a practical test instrument developed at the AATCC Research Laboratories at Lowell Massachusetts, appears to have unlimited potentialities for use in evaluating abrasion.

It has been said that the AATCC is a living, dynamic association. Certainly, its test methods reflect this type of vitality. AATCC test methods are under constant review and revision to keep them up-to-date and applicable to the practical needs of the American Textile Industry. Colorfastness testing in the United States has matured. Through quality control programs, colorfastness testing is playing an important role in raising the standard of living. The ISO meetings last week demonstrated the cooperative effort being expended on a world scale to unify methods of testing. Let us hope that the democratic spirit which permeated those meetings can also be reflected in international efforts for world peace.

As a closing remark, I would like to emphasize the fact that I have been but a spokesman or medium through which some of the activities of the AATCC research subcommittees could be expressed. The committee chairmen, research associates, and the AATCC. Research Laboratories at Lowell, Massachusetts, under the capable leadership of the AATCC Director of research, Dr Harold W Stiegler, have all contributed generously to the preparation of this paper —to them belongs the credit.

Perkin Centennial———

AATCC BANQUET

THE 1956 Annual Banquet of the American Association of Textile Chemists and Colorists was held Saturday evening, September 15, in the Grand Ballroom of the Waldorf-Astoria Hotel as the final event of the Perkin Centennial.

The address of the guest speaker, General Anthony C McAuliffe, on "Legacies of William Henry Perkin and 19th Century Science," may be found on pages P726-8 in this issue.

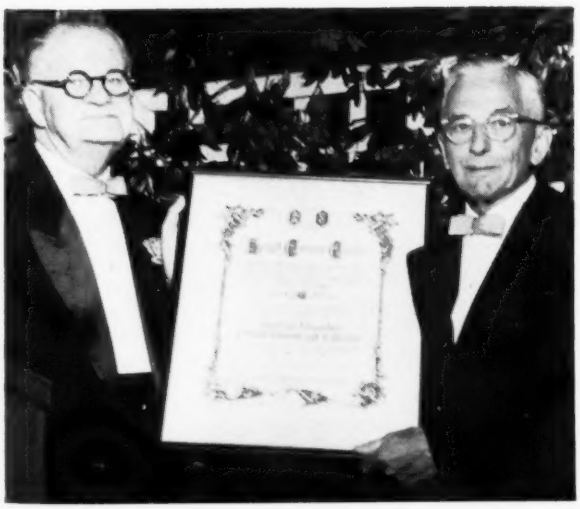
Greetings from
President Raymond W Jacoby

Gen Anthony C McAuliffe,
guest speaker

George O Linberg,
presiding

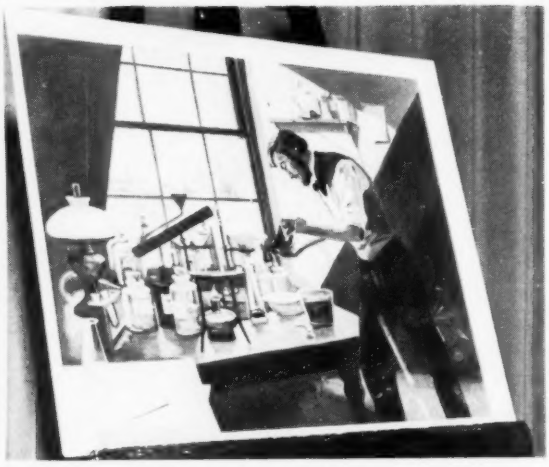
Harold C Chapin,
past secretary, AATCC

George P Paine,
executive secretary, AATCC



Harold C Chapin (right) receives from President Jacoby a handsome scroll in testimony of his retirement as secretary of AATCC after 23 years' service

President Jacoby receiving the Past President's Pin from J Robert Bonnar, wearer of an all-mauve dinner jacket



On behalf of the AATCC, President Raymond W Jacoby (left) accepts from Clifford Paine, president of the Society of Dyers and Colourists, a painting of Sir William H Perkin, presented to AATCC from Imperial Chemical Industries Ltd. A larger photo of the painting appears at the right.

Activities of the Local Sections

Piedmont

THE Committee for the Charles H Stone Scholarship Fund of the Piedmont Section has announced the awarding of $250 scholarships to Charles W Funderburk of Route #5, Lancaster, SC, a senior at Clemson College, majoring in textile chemistry & dyeing; and to Kenneth L McKinney of 1813 Oak Street, Greensboro, NC, a senior at North Carolina State College, majoring in textile chemistry & dyeing.

This is the second year that these awards have been made. It is planned to continue these awards annually to a senior or junior majoring in textile chemistry & dyeing at North Carolina State College, in Raleigh, NC, and at Clemson College, in Clemson, SC.

* * * *

THE Fall Meeting of the Piedmont Section will be held October 6th at the Hotel Charlotte, Charlotte, NC. Registration will commence 4 PM on Friday, October 5th in the hotel lobby.

The program:

10:00 AM — Research Committee — Parlor A

12:30 PM — Officer's Luncheon — Parlor A

2:00 PM - 4:00 PM — Technical Session—Ballroom

"Technology of Non-Woven Fabrics" by L P Wenzell, Celanese Corporation of America

"Binders for Non-Woven Fabrics" by N H Sherwood, B F Goodrich Chemical Co

5:30 PM — Social Hour — Ballroom Mezzanine

6:30 PM — Annual Banquet — Ballroom

Principal Speaker: Frank J Soday, vice-president, Research and Development, The Chemstrand Corporation. Subject: "Developments of Science and Industry in the South."

Registration fee — $1.00. Admission to the sessions will be by badge.

Make reservations directly with the Hotel Charlotte. One hundred and fifty rooms will be held until September 30th.

Philadelphia

THE Educational Committee of the Philadelphia Section, in cooperation with the Philadelphia Textile Institute, has announced that the new series of lectures on "Fabric Construction" will be presented by Frank L Giese, professor in charge of fabric design and development at the Philadelphia Textile Institute.

These talks are planned as basic information to dyers and slanted toward recognition of potential trouble or specific handling required in dyeing.

Six lectures will be presented on Monday evenings, beginning October 8, 1956, covering weave formations, fabric structure, basic raw materials, fabric qualities, yarns and yarn numbering, end use of fabrics, potential faults apparent in greige goods and their effect on dyeing and potential faults not apparent in greige goods but made noticeable by dyeing.

Cost for the six lectures is $12.00; nonmembers of AATCC $15.00. Applicants may register for this course through the Educational Committee, Philadelphia Section, AATCC, PO Box 5025, Philadelphia 11, Pa.

Philadelphia Section———

WASH AND WEAR FINISHES ON COTTON FABRICS*

HECTOR C BORGHETTY
Rohm & Haas Company
Philadelphia 5, Pa

INTRODUCTION

DURING 1955 approximately 600,000,000 yards of cotton fabrics were processed with "wash and wear" finishes. If, to this is added 800,000,000 yards treated with regular crushproof finishes, the total surpasses the yardage produced with all the newer synthetic fibers. Hence, chemical finishing of cotton fabrics comprising both "wash and wear" and regular crease-resistant finishes represent an important segment of fabrics destined for dress goods. It thus affects all those in the entire textile industry regardless of each individual's prime interest in cotton, rayon, wool or hydrophobic synthetics. The Philadelphia Section of the AATCC recognized this, and in 1951 selected for its Intersectional Contest Paper the subject of cotton crushproofing. The ground work for the development of crush-resistant finishes was outlined in that paper (*1*) and assisted in the development of regular crushproof finishes that eventually led to the merchandising of "wash and wear" garments.

DISCUSSION

WASH AND WEAR———The term "wash and wear" was coined and introduced by the manufacturers of the newer synthetic fibers with the claim that garments made from these fibers could be worn without ironing. The rapid acceptance by the consumer of such garments indicates the modern trend towards fabrics that give greater comfort and reduce the drudgery of ironing. It is well-known that, in many cases for fastidious requirements, it is advisable to iron the seams, but this does not detract from the fact that many garments that carry the "wash and wear" label require merely a minimum of care.

In order to render the cotton fiber satisfactory for use in "wash and wear" garments it was necessary to modify the intrinsic properties of the fiber both chemically and physically so that it would acquire crush resistance durable to washing.

RETALIATORY MEASURE———"Wash and wear" cotton fabrics were first introduced as a retaliatory measure on the part of the cotton finisher to counter the loss of business to the synthetic fibers, but they have been so well accepted that many garments for dress goods now carry a "wash and wear" label that is backed by excellent performance. It must also be mentioned, however, that there are fabrics that do not meet the severe requirements of "wash and wear" and have been justly criticized as not meeting the advertised claims.

The difference between "wash and wear" and ordinary crush-resistant cotton is merely one of degree. The converter, who first realized in 1954 that wrinkle-resistant fabrics of good physical properties and durability could be obtained by certain modifications, was able to capitalize on his improvements and apply a "wash and wear" label to his line of cotton fabrics. Those finishers, on the other hand, who have not yet adopted the new technological advances are still producing fabrics of low crease resistance and poor durability to washing.

The technology of chemical finishing, in one brief year, has come abreast of the scientific developments of the past decade and is now demanding further advances in a field that shows promise of great future growth. Some finishing plants, at present in the vanguard of resin treatment to modify cotton, predict that, in a few years, the majority of cotton dress goods will be of the "wash and wear" variety. This would entail the establishment of chemical-finishing techniques in mills that are at present not using thermosetting resins, and would carry with it an expansion in chemical consumption because the new techniques require large quantities of chemicals compared to the old methods of cotton finishing.

Cotton fabrics treated with resins did not become immediately popular when first disclosed 25 years ago by TBL (*2*) mainly because of the following three drawbacks:

1) The resins lacked resistance to chlorine, storage stability and durability to washing.

2) The consumer demand did not exist.

3) The loss in tensile and tear

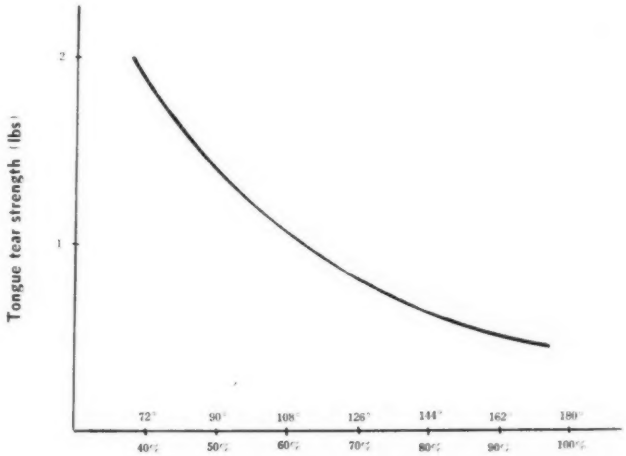


Figure 1
Crease recovery (by percent and by angle)

*Presented before the Philadelphia Section on March 2, 1956

strengths of resin treated fabrics had not come under control.

The first of these was overcome by the introduction of melamine and later of the reactant-type resins. The second retarding factor was overcome by widespread advertising of the "wash and wear" properties of hydrophobic fibers. A major contribution was the successful merchandising of the Everglaze finishes (3). The control of physical properties was brought on by the application of accumulated knowledge on catalysis, curing conditions, and the exact amount of resin required.

CRITICAL INTERRELATIONSHIP———The critical interrelationship between fabric properties and crease recovery can be readily illustrated by the curve in Figure 1.

It is quite evident that the amount of resin is the determining factor in crease recovery. As this amount increases the recovery goes beyond the 125° angle, which is considered indicative of a good crease-resistant finish. It is usually conceded that the known thermosets function by a mechanism that may differ in efficiency, but nevertheless gives equal crease recovery at equal loss in tear strength. The crease recovery is related to the embrittlement of the fiber; the higher the angle of recovery, the lower the tensile, tear and abrasion resistance. When the quantity of resin is reduced to give good physical properties the crease recovery angle becomes 105 to 115°, which is not sufficient to impart good muss resistance and good durability to washing. The selection of the type of resin required to give satisfactory crease recovery is usually based on its durability to washing and its ability to resist chlorine. The older monomeric urea-formaldehyde resins were not satisfactory in either respect and made way for the melamine resins, which, although apt to yellow in the presence of chlorine, had sufficient buffering action to prevent severe chlorine damage on ironing. The introduction later of chemically reactive resins designated "reactant types" made it possible to obtain improved durability to washing with no yellowing on contact with chlorine and a minimum of tendering after chlorination and scorching. Both the melamine and reactant-type resins, however, show the usual loss in physical properties at a given level of crease resistance even though, in the case of the reactants, the amount of solids required is one-half to two-thirds that necessary to give the same wrinkle recovery as the melamines. Because of the complete absence of surface polymer the reactants do not give any increased tendering, which often is caused by three-dimensional polymer on the surface of the fabric. The reactant resin, furthermore, leaves the fabric without any build-up of hand and merely contributes to increased wrinkle resistance, with a resulting soft hand.

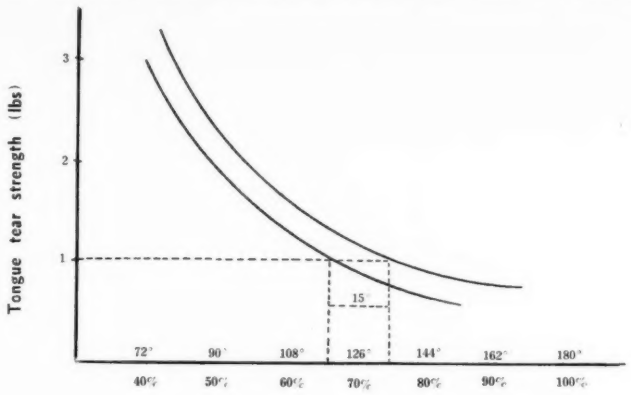


Figure 2
Crease recovery (by percent and by angle)

CATALYST———It had meanwhile been found that metal salt catalysts possess several advantages over the ammonium and amine salts, and permit delayed action catalysts, which avoids any danger of cure during the drying period and thus any migration and build-up of surface effects. They also gave a more complete cure, and thus a minimum amount of resin can be employed. Good catalysis yields fabrics that are 5 to 10% stronger than those in which catalysis is incomplete either because of the presence of excessive amounts of resin or the use of weak catalysts.

FABRIC CONSTRUCTION———A study of fabric constructions had meanwhile shown that low twist, loose weave and broken patterns yielded garments that were less apt to show wrinkling than those made from tightly woven, highly twisted yarns. Careful selection by converters of the correct fabric construction, together with an emphasis on printed and multicolored yarns, made possible garments of greater actual and/or apparent wrinkle recovery. Improved techniques of relaxed mercerizing, drying and curing, and of the correct use of the Sanforized treatment (4) led to slight improvements which, when taken as a whole, resulted in an increased recovery angle of about 15°. A more important advantage was revealed by Abrams and Sherwood of the Southeastern Section, AATCC (5), who discovered that wrinkle recovery could be improved by the addition of thermoplastic resins without any loss in physical properties of the fiber. The value of this observation has become quite important to the cotton-finishing industry and permits the merchandising of fabric that can be improved by either of the two following applications.

1) The addition of a soft thermoplastic acrylic resin improves crease recovery by 15° both in the warp and in the filling. This improvement is obtained without any decrease in the physical properties of the fiber. The crush-resistant effect imparted by the thermoplast when added to that of the thermoset gives fabrics with crease angles 10 to 15° higher than heretofore obtainable at the same strength levels. This extra 10 to 15° makes a very important contribution at this level of crease resistance. The portion of crush resistance imparted by the thermoplast addition is fully as resilient and fully as durable as the corresponding portion contributed by the thermoset.

2) Improved physical properties of thermoset-treated fabrics, at equal crease recovery can be obtained by reducing the thermoset content and replacing it with an equivalent amount of thermoplast.

In Figure 2 it is shown how the curve of crease resistance differs when a thermoplastic resin is added. The top-most curve shows that the tear strength is greater at equal crush resistance. The increase in crease recovery of 15° is plotted on the curve at equal tear strength of 1 pound. The resultant fabric shows a recovery angle of 133° instead of 118°. The graph is similar for either warp or filing and, furthermore, applies to any method of testing for tear strength on the stand-

TABLE I

Standard Formula (lbs per 100 gals at 75% pick-up)	Suggested Formula (lbs per 100 gals at 75% pick-up)	
Reactant (50%)	Reactant (50%)	Acrylic dispersion (35%)
85	65	40

TABLE II

Treatment	Crease recovery (°) before FSW*		Tensile (1" Strip) before FSW*		Trapezoid tear (lbs) before FSW*	
	Warp	Filling	Warp	Filling	Warp	Filling
10% Reactant (50%)	111	104	22	20	1.7	1.3
10% Reactant (50%) 5% Acrylic dispersion (35%)	128	117	23	18	1.6	1.3

*Full Sanforized wash

ard laboratory instruments. This type of curve also resembles that of the tensile strength of a cotton fabric treated with thermosetting resins.

PRACTICAL APPLICATIONS———Many of the better "wash and wear" garments embody all recent improved techniques of fabric treatment, together with the addition of a thermoplastic acrylic resin, and all these improvements combine to produce crease recovery heretofore unattainable on cotton fabrics. A fabric so processed, and showing an angle of 133° in both directions, has excellent resilience and recovery from creases even after several launderings. It shows little mussing and is suitable for "wash and wear" garments.

Many finishers of cotton fabrics have found themselves in difficulty when they could not meet the physical specifications of tear, tensile abrasion and wear established for fabrics destined for garments. Such difficulties can be avoided by control of the conditions of catalysis as above, and particularly by the reduction in the amount of thermosetting resin used. Normally a reduction of 20% raises the tensile strength by 2 to 4 pounds on a fabric having a breaking strength of 25 pounds. In order to compensate for the loss in wrinkle recovery caused by the reduced amount of thermoset, the thermoplastic resin must be added.

The typical formulation in Table I shows the amount of resin normally used on 80 x 80 cotton fabric, against a recommended formulation that incorporates a thermoplast in place of a portion of the thermoset. The correct additions of catalyst, penetrant and softener should also be present in these applications.

An example of what can be expected is given in Table II, which shows the improvement in crease recovery achieved by adding a soft thermoplast to a standard formulation based on a reactant resin padding solution applied to cotton 80 x 80 fabric at 75% retention.

Each type of fabric requires an optimum formulation according to specifications of physical qualities, crease recovery, durability to washing, soil re-deposition and type of finishing equipment. The selection of the thermoplast is influenced by these factors as is also the thermoset.

The thermoplastic resin is nonnitrogenous and does not affect the chlorine resistance of the fabric. It is known that softer thermoplasts impart a greater degree of crease recovery and are, therefore, preferable for use with thermosets. Soft thermoplasts carry a detriment in terms of running conditions on padders, guide rolls and drying units, where they tend to stick and require special precautions, such as immersion of the lower roll of the padder in the liquid, tight squeeze, and rapid passage into the drying units. An important improvement in the running qualities of thermoplasts is available by the addition of silicone emulsions or nonionic surfactants. The former contribute good running by eliminating the tackiness on the pad roll, while the latter function by improving the stability of the padding solution. The silicone resin, in addition, acts as a softener for the fabric and as a lubricant during the sewing operation.

CONCLUSION

Cotton "wash and wear" finishes date only from 1954. They have proven satisfactory and popular and promise to continue to make rapid strides in the growing market for more casual garments. They have stimulated the textile industry by making necessary a closer interchange of information between the mills and the chemical manufacturers. The modified cotton that results from correct application of thermosetting resins has overcome one of the main drawbacks of a fiber that represents 65% of the entire textile consumption.

REFERENCES

(1) Philadelphia Section, AATCC, "Some Variables in Improving the Crease Recovery of Cotton Fabrics with Synthetic Resins", *Am Dyestuff Reptr 41*, No. 7, P196 (March 31, 1952).
(2) Total Broadhurst Lee Co, Ltd
(3) Trade mark registered by Cluett, Peabody & Co, Inc
(4) Trade mark registered by Joseph Bancroft & Sons Co
(5) Southeastern Section, AATCC, "Modification of Urea-formaldehyde and Melamine-formaldehyde Crease-resistant Finishes with Polymeric Latices," *Am Dyestuff Reptr 43*, No. 24, P780 (November 22, 1954).

PSW SECTION OUTING COMMITTEE—The Outing Committee for the Pacific Southwest Section has completed plans for a 2-day affair, Oct 12-13 at The Inn, Rancho Sante Fe, California. A full program of events is slated.

Committee members (l to r) are: M H Behrendt, Catalina Inc, *chairman;* H W Ellsworth, West Coast Carpet Dyers; R W Sumers, National Aniline Div; and F Thatcher, Modern Dyers.

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LITERARY STYLE AND FORM OF PRESENTATION—In the writing of papers, authors are requested to observe a trenchant, simple style of writing directed to textile chemists and colorists with at least an elementary knowledge of chemistry, physics, mathematics, engineering, textile processes and textile machinery.

In the organization of the material, there should be one or more introductory paragraphs setting forth the occasion, significance and main objectives of the paper and of the method of attack. This should be followed by the body of the presentation, either with discussions interspersed throughout this portion or with a collected section marked "DISCUSSION" after the main body of the paper. Finally, there may be a brief section at the end entitled "SUMMARY" or "CONCLUSIONS."

Center and side headings make for easier reading. Center headings should be employed sparingly and generally will include only very important section headings, such as "INTRODUCTION," "EXPERIMENTAL," "DISCUSSION," "CONCLUSIONS," "SUMMARY," and "REFERENCES." Side headings (see sixth paragraph of this *Notice* for an example) shall be indented and run into the text to which they apply, and shall be separated from the paragraph by a dash. The publisher will print center headings in bold-face capitals and side headings in capitals.

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A COMPARISON OF METHODS FOR TESTING THE FASTNESS TO GAS FADING OF DYES ON ACETATE*

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The authors review the historical development of test methods for determining fastness to gas fading and the causes of this type of fading. They have carried out comparative tests with two types of equipment suggested by the International Organization for Standardization (ISO) and German Fastness Commission (DEK), respectively, and have quantitatively determined the generation of nitrous gases.

INTRODUCTION

Of the fibers that are manufactured from regenerated cellulose, acetate was the last to appear on the market as a useful material for the manufacture of fabrics. This was perhaps because fundamental technological difficulties had to be overcome, which, during many stages of its development, made the use of cellulose acetate as a fiber even questionable.

Since the discovery of cellulose acetate by Schuetzenberger *(1)* in the year 1865, the various problems encountered in the development of this fiber for practical use have been as follows:

1) Preparation of cellulose tricetate (primary cellulose acetate)
2) Preparation of cellulose 2½-acetate (secondary cellulose acetate)
3) Manufacture of an acetate fiber
4) Dyeability of the acetate fiber
5) Resistance of dyeings to atmospheric gases
6) Devising test methods for testing fastness to gas fading

Problems 1 to 5 inclusive can be considered mainly solved, whereas problem 6 has been worked at in many places, but there is still need for an acceptable standard method for testing fastness to gas fading.

SURVEY OF TESTING METHODS

——FL Goodall *(2)* was the first to establish the fact that a change of shade takes place in acetate dyeings upon exposure to a burning gas flame. He recognized that the cause was the formation of oxides of nitrogen at the outer surface of a burning cone of gas or at the surface of a glowing wire, whereby not only the dyestuff but also the fiber was changed with the transformation of the fiber to cellulose nitrate.

FM Rowe and KJA Chamberlain *(3)* in 1937 published the first fundamental work on the processes involved in gas fading. They presumed that the basicity of the anthraquinone derivative under test influences the resistance to gas fading and that, besides a primary diazotization, nitration, or oxidation of the dyestuff, a secondary decomposition of the compound formed takes place because of the action of light, moisture, or acids.

Wm H Cady in 1939 published a review of the "Gas Fading of Dyes" *(4)*, and in 1940 Chas A Seibert *(5)* reported a long work on the change of shade of dyed acetate. According to Seibert nitrous gases arise from the burning of coal, oil, and gas as well as at the surface of glowing wires. The change in acetate dyes caused by the exhaust gases of internal combustion engines was also investigated. In this work different pieces of apparatus for testing gas-fading fastness were described, in all of which burning gas flames were employed for the development of nitrous gases so as to simulate natural conditions as nearly as possible. It appeared that the degree of change in acetate dyeings was largely governed by the temperature, the humidity, and the rate of flow of the developed gases.

This work was the basis for the first suggestion by the American Association of Textile Chemists and Colorists of a method for testing acetate dyes for fastness to gas fading *(6)*. In this connection we should mention that suggestions for improving the testing of gas fading are made yearly in the AATCC "Technical Manual and Year Book" *(7)*.

FP Greenspan and PE Spoerri *(8)* investigated the influence of the pure oxides of nitrogen, such as N_2O, NO, and NO_2, on anthraquinone derivatives. Although N_2O caused no change of color and NO only a noticeable change, NO_2 was found to cause a considerable change of color. The oxides of nitrogen liberated from acidified solutions of $NaNO_2$ were also found to change acetate dyes, dilutions of 1:10 000 to 1:1000 000 having been effective, dilutions of 1:5000 000, barely perceptible, and 1:10 000,000, ineffective in causing a change.

In a further work Chas Seibert *(9)* described the establishment of a "Standard of Fading," by the help of which the degree of change of color of test pieces could be established with nitrous gases. This work formed the basis for an AATCC suggestion *(10)* for an improved method for testing gas-fading fastness. Seibert pointed out again in this publication the uncertainty of results from variations in humidity and temperature.

The National Bureau of Standards (US) also published *(11)* directions for the determination of fastness to gas fading, which coincided for the most part with the suggestions of the AATCC.

The testing method employed in England was given by the Fastness Test Committee *(12)*, according to which nitrous gases were developed by the effect of phosphoric acid on a solution of sodium nitrite.

In 1948 appeared a series of seven researches by F K Ray and collaborators *(13, 14, 15, 16, 17, 18,* and *19)*, in which the testing of gas-fading fastness was treated from very different points of view. Partly through a considerable expenditure for apparatus the amount, temperature, and humidity of the effective gases streaming through the apparatus were varied, from which variations in results were observed. Likewise, the effect of nitrous gases on different kinds of fibers and fiber groups was investigated as well as the change in different finished fabrics after washing.

In the last work referred to *(19)*, the best conditions for testing fastness to gas fading were summarized as follows:

Temperature, 130±5°F (55±2.5°C)
Relative humidity, 15±5%
Duration of exposure, 80 min
Amount of effective gas, about 85 cc /Std.
Total amt of air and gas passing, 276 l/Std.

* Translated by Carl Z Draves, with the permission of the authors and the publisher, from *Melliand Textilberichte* **37**, 321-324 (1956)

Nylon dyeings produced with disperse dyestuffs were also investigated by E Meili *(20)*, who attributed the susceptibility of disperse dyes on acetate in contrast with nylon to the solvent power of acetate fiber for nitrous gases.

In this connection, it is interesting that G T Douglas *(21)* also noticed that nitrous gases have no effect on dyes applied on wool or nylon.

M Couper made the important contribution to gas fading literature *(22)* of isolating the decomposition products of an anthraquinone derivative on acetate formed from exposure to a Fade-Ometer and, in another experiment, from exposures on acetate to nitrous gases. It is striking that the same decomposition product made its appearance in both instances.

V S Salvin and others *(23)* published a general survey concerning the sensitivity of dyes to atmospheric gases, and in their own experiments included various substrata, such as cotton, viscose, rayon, Celcos (partially saponified acetate), wool, nylon, Orlon acrylic fiber ,and Dacron polyester fiber. In these experiments it was found, among other things, that on cotton, viscose rayon, wool, and nylon no NO_2 could be found; on Celcos fiber, only slight to medium amounts; and on acetate as well as Dacron, medium to high amounts.

A Greyborn *(24)* described a further possibility of testing gas-fading fastness, in which nitrous gases were developed by the use of a $NaNO_2$ solution soured with dilute sulfuric acid. The use of burning gas flames did not seem advisable to him for the development of NO_2 fumes because of the long time required.

In another publication *(25)* have been described the types of apparatus suggested by the AATCC in America and the Society of Dyers and Colourists in England.

J Eisele and W Federkiel *(26)* have recently given a general survey of the fastness of dyeing to atmospheric gases.

With the founding of the International Organization of Standardization (ISO) in 1947, there was also created Technical Committee 38 (TC 38), which in the Color Fastness Subcommittee (SCI) is concerned with the standardization of fastness testing methods for dyeings. In a report of the English Fastness-Tests Co-ordinating Committee *(27)* concerning the recommendations of ISO/TC 38/SC 1 for standard fastness tests the testing of gas-fading fastness by the use of nitrous gases developed from a burning gas flame is also described.

The German Fastness Commission (DEK), on the other hand, suggested *(28)* a testing method making use of nitrous gases liberated from a Na NO_2 solution by acetic acid. According to this procedure (see Figure 2),

375 ml water
50 ml glacial acetic acid and
75 ml sodium nitrite solution, 1:100,

are added to an evaporating dish, and then a bell jar is placed over it. A slowly turning propeller over the dish provides for uniform distribution of the gases.

The test sample (4x10 cm) is held in a vertical position between the radial struts of a glass frame by glue on the narrow ends, and is then subjected to the test at room temperature. If necessary, this procedure can be carried out in a 15-liter wide-mouthed bottle, the water and chemicals being placed on the bottom and the dyeings on a round propeller-like structure with glass struts, which is rotated in the bottle at room temperature.

To recapitulate, it has been established that, in the main, two methods for testing the fastness of dyeings to gas fading are in use: in one the required nitrous gases are developed with a burning gas flame, in the other, from an acidified solution of sodium nitrite.

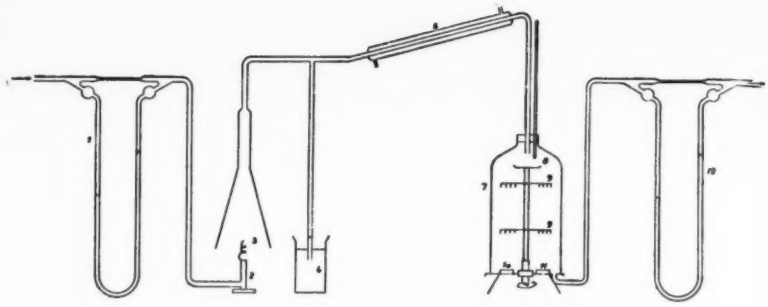

Figure 1
Apparatus suggested by Society Dyers and Colourists and illustrated in *J Soc Dyers Colourists 71*, 338 (1955).

EXPERIMENTAL

STATEMENT OF PROBLEM—It now seems of interest to compare experimentally the method proposed by the ISO/TC 38/SC 1 with the DEK method, the concentration of nitrous gases being photometrically determined from the color of the red azo dye formed in a solution of sulfanilic acid and alphanaphthylamine.

EXPERIMENTAL ARRANGEMENTS AND CONDITIONS—The apparatus for testing gas-fading fastness with combustion gases was set up according to a sketch from the ISO/TC 38/SC 1 (Figure 1). The volume of inflowing illuminating gas was measured by a calibrated rotameter, the volume of the gases flowing through the apparatus, by a gas meter. It was thus possible to check the somewhat insensitive manometers at the front and back ends of the apparatus, respectively.

Different quantities of illuminating gas were allowed to flow through the microburner, the rate of flow of gas mixture being constant for any given selected quantity of gas. The burner was also used with and without a platinum spiral, and, in addition, the form of the spiral was changed. In two experiments the microburner was replaced with a glass tube drawn out to a capillary in order to eliminate any possible catalytic effect from the metallic burner tube. When the platinum spiral was in place on top ot the burner, the supply of gas was briefly interrupted so that the illuminating gas flame went out; and then the gas supply was re-established, whereat the platinum spiral glowed again because of the hydrogen that was passing by. Nitrous gases also formed under these conditions and were determined analytically.

The concentration of nitrous gases in the DEK apparatus shown in Figure 2 was determined by drawing a stream of air through the system and absorbing the gases in three absorption bottles attached in series. [The senior author told the translator that the concentration of NO_2 in the apparatus was not appreciably lowered by the amount that reacted with the test sample.]

For photometric measurement we employed an Eppendorf photometer with a filter for the 546-millimicron mercury line at a layer thickness of 10.0 mm.

The composition of the illuminating gas for the gas-flame experiments was as follows:

CO_2	2.3%
C_2H_4	2.7%
O_2	0.7%
CO	7.1%
CH_4	23.6%
H_2	52.8%
N_2 etc	10.8%

The measurements of NO_2 concentration were carried out under like conditions on three different days in order to ascertain the possible effect of constantly varying average combustion value on the formation of nitrous gases. The combustion values were as follows:

Day	*Kilocal per cu meter*
1st	4644
2nd	4653
3rd	4678

In addition, we used propane as the fuel, with which generally a platinum spiral was employed for raising the concentration of NO_2. In two instances, however, the burner was operated without a platinum spiral. For lengthy experiments, however, a platinum spiral is not suitable as it becomes badly blackened.

In the determination of the concentration of nitrous gases in the DEK apparatus the absorption time was varied from 5 to 120 minutes.

RESULTS —— Nitrous gases are formed when illuminating gas burns in a microburner even in the absence of a platinum spiral. As Experiments 1, 2, 10, and 11 in Table I show, the experimental errors lie within narrow limits when one considers that the second decimal place indicates only hundred thousandths of a gram. Table I shows not only that the analytical methods give reproducible values but that slight variations in concentration of NO_2 are not to be expected from slight variations in combustion value.

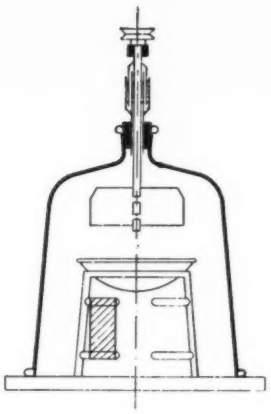

Figure 2

Apparatus suggested by DEK and illustrated in Circular No. 975 from BASF in Ludwigshafen. In an improved version the test pieces are rotated on a frame above the dish, and a glass cover is placed on a triangle resting on the dish.

If the microburner is allowed to burn with a tightly wound platinum spiral on top, the concentration of NO_2 developed increases in comparison with burning under similar conditions without a spiral (Experiments 3 and 4 in Table I). After a long experiment, the platinum spiral blackens; if it is then heated until it ceases glowing and cleaned with conc HCl, the NO_2 considerably increases (Expt 13). Drawing out of the spiral or setting it high has little effect on NO_2 concn, so that the effect can be neglected. The NO_2 concentration in this case falls off slightly (Experiments 12 and 14 in comparison with 3 and 4 in Table I).

When the amount of illuminating gas is varied (Expts 4, 5, 6, and 7, 8, 9) with conditions remaining the same (tightly wound platinum spiral), the amount of NO_2 formed *decreases* with increasing amount of gas. This can be explained by the cooling action of increased amounts of fresh gas and a consequent lesser catalytic effect.

When the platinum spiral barely glows, the amounts of NO_2 formed are relatively slight, but here too the concentration of NO_2 at high total amounts of illuminating gas is smaller than at medium amounts (Expts 7, 8, 9, Table I).

On the other hand, if Experiments 1, 2, 10, and 11 are compared with 15 and 16 in Table I, it is seen that the amount of NO_2 formed is somewhat less for a glass capillary.

The use of propane gas for heating leads to somewhat higher concentrations of NO_2 than the use of illuminating gas when reference is made to equal gas volumes (Expts 19, 20, 21, and 22 in Table II). This is understandable from the difference in heat value.

In the DEK apparatus (Figure 2) increasing amounts of NO_2 are liberated in proportion to the duration of the experiments, but the amount present after 120 min is still only about one-seventh of the total calculated from the stoichiometric equation for nitrite and acid employed (Experiments 23 to 36, Table III). [The NO_2 unaccounted for remains in the solution.] A comparison of the values measured in the DEK apparatus and in that of the ISO shows that those of the former are significantly higher. Thus 37.0 mg of NO_2 is formed in an experiment time of 30 minutes on the average in the DEK apparatus,

TABLE I

Expt No	*Illuminating Gas*		*Conditions of Burning at Microburner*	*NO_2 mg*
	ml per min	*Total*		
1	300	1500	burns without Pt spiral	0.140
2	300	1500	burns with tightly wound Pt spiral	0.228
3	300	1500	burns without Pt spiral	0.166
4	300	1500	burns with tightly wound Pt spiral	0.239
5	250	1250	burns with tightly wound Pt spiral	0.263
6	350	1750	burns with rightly wound Pt spiral	0.176
7	250	1250	barely glowing Pt spiral	0.044
8	300	1500	barely glowing Pt spiral	0.043
9	350	1750	barely glowing Pt spiral	0.026
10	300	1500	burns without Pt spiral	0.154
11	300	1500	burns without Pt spiral	0.146
12	300	1500	burns with untwisted Pt spiral	0.204
13	300	1500	burns with tightly wound, no-longer-glowing Pt spiral	0.488
14	300	1500	burns with highly placed Pt spiral	0.194
15	300	1500	burns from glass capillary	0.126
16	300	1500	burns from glass capillary	0.138
17	300	9000	burns from glass capillary	0.595
18	300	9000	burns from glass capillary	0.660

TABLE II

Apparatus Suggested by ISO

Expt No	*Propane Gas*		*Conditions of Burning At Microburner*	*NO_2 mg*
	ml per min	*ml total*		
19	150	750	burns without Pt spiral	0.093
20	150	750	burns without Pt spiral	0.095
21	150	750	burns with Pt spiral	0.110
22	150	750	burns with Pt spiral	0.139

TABLE III

DEK Apparatus for Testing Gas-Fading Fastness

Expt No	*Running Time minutes*	*NO_2 Formed mg*
23	5	2.44
24	5	1.87
25	10	7.50
26	10	6.18
27	20	13.69
28	20	10.07
29	30	38.10
30	30	35.90
31	45	39.30
32	45	41.75
33	60	45.50
34	60	49.10
35	120	64.10
36	120	76.20

while in the ISO apparatus in the same period of time only 1.4 mg is formed. An equal effect is therefore attained in the ISO apparatus only after about 13 hours.

It is to be observed from the values in Table III, that the rate of development of NO_2 is most active at the beginning and abates with increasing time.

DISCUSSION

As the results before you indicate, the concentration of nitrous gases from the burning of gas flames is to some extent subject to considerable variation. Although slight differences in the heating value of a single gas source or somewhat different forms of platinum spiral do not have a significant effect on the results of experiments, greater differences in form as well as, more especially, the burning off of the spiral by heating it to glowing, as is necessary for a series of tests, do adversely affect the results considerably.

The combustion value of the gas undoubtedly also has an effect, if it varies considerably, and this must certainly be so from an international viewpoint. In Table IV are cited analytical data for different kinds of illuminating gas in today's Germany. If one considers also that natural gas if often cut with water gas, as for example in America, the differences in composition may well be considerable.

As already mentioned in different investigations, fastness to gas fading is affected by relative humidity, and constant relative humidity is not always easy to maintain in testing. This is especially so in the open type of apparatus suggested by the ISO, while, in a closed system like that represented by the second apparatus (Figure 2), a definite humidity is given at a relatively easily maintained constant temperature.

With the ISO apparatus, apart from the greater time it requires, one does not get experimental results that correspond absolutely to practical conditions. Gas fading, to be sure, was first observed from the effect of a gas flame. On the other hand, the gas fading that occurs in industrial regions, or anywhere that nitrogen and oxygen react with each other at elevated temperatures, is probably not simulated in its effect by this apparatus.

Since NO_2 is definitely recognized as the damaging component of waste gas in the atmosphere, it is obvious and appropriate always to prepare it in a simple manner from well-defined starting substances and, besides, to keep the length of the experimental method within reasonable limits. This is especially important for a series of investigations. Furthermore, experiments have shown the possibility of reducing the nitrite and acid concentrations to the point where there is no chance of developing such a surge of NO_2 that the protective action of gas inhibitors might be impaired. The use of another suitable acid is not important, but acetic acid can be replaced with phosphoric acid if desired.

In this connection we were able to establish that a much faster change of color in the test piece takes place from dropping the prescribed amount (75m) of sodium nitrite solution into dilute acid then from dropping glacial acetic acid (50m) into the diluted sodium nitrite. The change of color in both instances, however, proceeds very rapidly in the same direction, so that more delicate differences in shade cannot be distinguished. We have therefore reduced the amounts of sodium nitrite and glacial acetic acid to one-third, that is, to 375 ml water, 16.7 ml glacial acetic acid, and 25 ml of 1:100 sodium nitrite solution. The nitrite solution in the correspondingly changed apparatus is run into the suggested acetic acid solution drop by drop in a period of 5 minutes. This procedure makes it possible to distinguish smaller color differences. We therefore consider it practical to carry out a test for fastness to gas fading in this manner.

TABLE IV
Compositions of Typical Illuminating Gases

		II	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*Natural Gas (German)*
CO_2	2.37	1.74	2..0	1.70	2.14	2.23	2.2	2.8	3.0
C_nH_n	2.12	2.80	2.50	2.00	2.21	1.97	2.0	3.0	—
O_2	0.39	0.60	0.65	0.39	0.41	0.35	0.4	0.6	—
CO	6.66	5.40	5.42	4.99	6.44	5.42	6.5	7.2	—
H_2	56.15	57.32	57.07	57.83	57.01	54.33	56.6	52.2	—
CH_4	25.02	26.08	23.97	23.82	24.18	24.80	23.5	26.8	89.0
N	7.29	6.06	8.39	9.27	7.61	10.9	8.8	7.4	8.0

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Abstracts

The Rotproofing of Viscose Rayon with Iron and Chromium Salts

Bell, J W and Ramsey M M, *J Soc Dyers Col* **72**, 168-71, April, 1956.

Mineral Khaki has been used for many years as a cheap pigment for cotton materials, and more recently attention has been paid to its rotproofing effects. It is generally accepted that the iron functions as a pigment only, but the use of iron and chromium, or chromium alone, is officially recommended in Great Britain for the purpose of rotproofing.

The process has been employed in many investigations by other workers. There is, however, little information on the use of such pigments on viscose rayon. The present paper describes work carried out to study the effect of certain treatments, similar to the application of Mineral Khaki, on the resistance of viscose rayon to micro-organisms.

Although Mineral Khaki treatments, as stated, are recommended for proofing cotton, certain types of chromium and iron pigmentation are shown by the authors to be relatively ineffective when applied to viscose rayon, at least when fairly drastic test methods are employed. This is in agreement with results obtained by others with cotton. The proof is slightly improved by using potassium chromate as the developing agent, but the sexavalent chromium produced is not fast to leaching. Little improvement is effected by incorporating copper.

The viscose rayon takes up considerably less pigment than cotton under similar conditions, but even where the amounts are almost the same the rayon is still much less resistant to micro-organisms. This difference may be partly due to the lower inherent resistance of viscose rayon.

When chromate development is used, the rayon appears to be less damaged (as measured by cuprammonium fluidity) than cotton similarly treated. By tensile strength measurements, however, the treated rayon is found to have lost up to 30 percent of its strength.

The authors quote 16 references to the literature.—WHC

The Spectral Regions of Daylight which Cause Fading

McLaren, K, *J Soc Dyers Col* **72**, 86-99, June, 1956.

Organic coloring matters are faded by absorbed ultraviolet and visible radiation up to a critical wavelength, above which radiation is non-actinic even if strongly absorbed. The wavelength is generally related to the normal lightfastness of the coloring matter, "normal" referring to the substrate for which it was originally developed, eg, vat dyes on cotton, disperse dyes on acetate. The critical wavelength decreases as the resistance to fading increases, being in the red when the lightfastness is 1-2 (minimum) and in the blue when it is 6-8 (maximum); there are, however, some exceptions to this rule.

As long-wave radiations preponderate in daylight, and as the absorption bands are usually strongest in the visible spectrum, fugitive organic coloring matters are mainly faded by visible light, while those of high normal lightfastness can in general be faded only by ultraviolet, violet, and blue light.

The differences between the composition of actinic radiation constituting daylight and that emitted by the enclosed carbon arc have been shown to be relatively unimportant as a possible source of *gross* anomalies in lightfastness testing based on comparison with lightfastness standards. These differences do, however, render meaningless any attempts to equate one hour's lamp exposure with so many hours' sunshine. An assumption that this is possible is widely held in the USA and is encouraged by the manufacturers of the Fade-Ometer.

The author believes that lamp exposures should never be regarded as a substitute for daylight testing, but merely as a means of obtaining a fairly reliable indication of the actual lightfastness when time does not allow a daylight exposure to be made.

Included in the paper are curves showing the absorption spectra of a large number of dyes, and much information about the British standards of lightfastness.—WHC

Polyethylene Fiber Today

Erlich, V L, *Modern Textiles* **37**, #5, 34, 46-8; #6, 37, 53-60 (1956).

Polyethylene resin is made by several US manufacturers, but the so-called "ICI type" is the one principally discussed in this paper.

The author discusses the production of polyethylene fibers, which are extruded at 400-600°F, cooled, and cold-drawn at least 500 percent of their original length. By this treatment the molecular chains become oriented.

The filaments at this stage are dimensionally unstable, losing about 5% at 110°F, 15-25% at 165° F, and 60% up at 212°F. By suitable treatments (eg, annealing at 30-50°F) they can be made practically stable up to 140°F, and shrink only 5% at 165°F.

The polyethylene fiber is sensitive to sunlight and outdoor exposure. When used as insulation for cables, the Bell Telephone Laboratories have found that addition of carbon black of low particle size gives adequate protection for most applications.

When the fiber is used for woven automobile seat covers, filaments colored with selected pigments were found to have increased resistance to exposure. Such pigments must be free from oxidizing compounds or substances that catalyze oxidation. Seat covers made of polyethylene are said to be odorless and permanently flexible.

Aerial tow-targets, made of this fiber, adopted by the US Air Force, are able to preserve their flexibility and toughness at temperatures far below zero. By the introduction of electrically conductive materials, such as aluminum foil, these targets can be made radar-reflective.

Polyethylene fibers are also used in air filters, as fusion threads in interlining cloths, in nonrotting ropes for marine purposes, and in chemical filtration processes. It is interesting to note that if the fibers are irradiated (eg, in the atomic pile) they acquire a higher softening point and better dimensional stability.

The introduction of a new type

of polyethylene, developed by Phillips Petroleum Co, is said to permit production of much stronger filaments and fabrics, with greater resistance to abrasion and a higher softening point.

A bibliography of 34 references to the literature is included.

Stretch Yarn Processes and End Uses

Richardson, H H, *Canadian Textile J* **32**, 49-50 July 29, 1955.

The author points out that the first stretch yarn was Lastex, a rubber cord covered with cotton yarn. It had limitations for general purposes, however, due to its rubber content.

About 4 or 5 years ago a Swiss engineer evolved a stretch yarn from nylon, which is known as "Helanca." This is made by combining two strands of nylon that have been given a high number of twists, but in opposite directions, and heat-set.

The manufacture of Helanca yarn is complicated and expensive, and the need of additional products has led to the development of a series of new crimped, textured, or stretch yarns, with varying characteristics and varying end-uses, but having in common a single-process system of manufacture. Following are the names, particular characteristics, and most obvious end-uses of some of the most important new developments:

"Agilon", a non-torque stretch yarn developed by Deering-Milliken, is suitable for ladies' hosiery, tricot and other knit goods.

"Ban-Lon", a crimped stretch yarn controlled by Bancroft, combining bulk and stretch, is suitable for knit goods, particularly sweaters and socks.

"Taslan", a textured or bulk yarn developed by du Pont, finds uses in woven fabrics such as dress goods and shirtings.

"Chadalon", of Chadbourn Hosiery, and "Shape-2-U", of Burlington, both high-torque monofilament nylon yarns, are used in ladies' full-fashioned stretch stockings.

"Fluflon" and "Superloft", developed by the Universal Winding Co., are stretch yarns almost identical with Helanca but made by a single process. They are being used for half-hose and underwear at present but are believed to have great possibilities.

The author discusses the development of twisting and winding machines for producing these stretch yarns.—WHC

How to handle Dacron-Cotton Blends

Rumsey, J S, *Modern Textiles* **36**, 69-72, July, 1955.

Intimately blended fabrics of Dacron and cotton are now being used in many forms where the functional characteristics of Dacron polyester fiber and the aesthetics and comfort of cotton are combined to bring new values to the consumer.

It has been found that the fabric strength of a blend of Dacron staple and cotton, in low percentages of Dacron, is actually lower than all-cotton until as much as 60% Dacron is used. This is due to the different elongation characteristics of the two fibers, and is indicative of what must be considered in engineering such a blend.

Considerable laboratory and wear testing of various fabrics of Dacron by the du Pont Company has indicated that to achieve such a basic fabric with a high-performance level, at least 65% Dacron is needed in an intimate blend with long-staple cotton. Then, with proper fabric construction, dyeing, and finishing, and garment fabrication, a product is obtained that is attractive, comfortable, easy to care for, and long-wearing.

Perhaps the most important and desirable characteristic of a garment made from such fabrics is the ability to wash the garment, have it dry quickly, and be ready to wear with little or no ironing. Such garments are known as "wash-and-wear." The basic requirements are that the fabric must be inherently stable dimensionally to laundering. It must resist wrinkling even when soaking wet. It must retain its press and appearance through a normal home-laundering cycle appropriate for the garment, and still look good enough to be worn without pressing.

The authors discuss the variables that must be controlled in order to obtain the maximum "wash-and-wear" effects. The use of high yarn twist is important. Tightly woven constructions are favored, as they are less inclined to pill. Plied yarns are preferred to single yarns.

For bleaching these blends, Textone is favored, though peroxide is suitable if only the cotton is to be bleached. The Dacron is dyed with disperse dyes at 250°F (or at the boil with a carrier), and the cotton is dyed later with vat dyes. The two fibers may also be dyed by a 1-bath process, using developed dyes for the cotton and disperse dyes for the Dacron.

A compressive shrinking operation is necessary to make the cotton component dimensionally stable to washing.

Full instructions are given for carrying out these various processes.

The Effect of Solvents on Wool Dyeing

Kärrholm, M and Lindberg, J, *Textile Research J* **26**, 528-30, July, 1956.

The rate of sorption of many dyes on wool is controlled by the cuticle of the fiber. It has been shown that it is the surface layer of the cuticle which is the main "barrier" for dyestuffs and other polar substances. However, on unmodified wool some parts of the surface layer can be easily penetrated by dyes, resulting in large differences in dyeing rate from fiber to fiber and between different parts of the same fiber. The treatment of wool with alcoholic potash results in an increased dyeing rate, caused by an increased and homogeneous permeability of the surface layer.

By treatment of wool with either alcoholic potash or chlorine, the weakly polar and hydrophobic surface becomes hydrophilic and permeable to polar substances, eg, dyestuffs.

The whole problem of continuous dyeing of wool is dependent on the possibility of making the permeability of the surface homogeneous, either by treating the fibers or by selecting proper dyes and dye assistants. Such dye assistants are used for synthetic fibers to increase the dyeing rate and are known as "carriers". The authors discuss the theory of this "carrier" action, and its possible application to wool dyeing.

The authors have been informed that addition of butanol to the dyebath increases the dyeing rate of wool. They describe some dyeing experiments on this fiber in which amyl alcohol was used as a "carrier" for acid dyes. They found that the dyeing rate (at 60°C) of a monosulfonated dye (*CI* 176) was increased ten times by the addition of the amyl alcohol; the rate of a disulfonated dye (*CI* 182) was increased four times; while the rate of a trisulfonated dye (*CI* 185) was unchanged. Obviously the degree of sulfonation determines the solubility of the dye in the amyl alcohol, and this solubility, at least to some extent, is a necessary condition to get an increased dyeing rate.

The authors also describe experiments made with a 1:2 chrome-complex dye, Cibalan Blue BL, which

has no sulfonic acid groups. The effect of amyl alcohol here was much greater than on the monosulfonated acid dye.

An increased dyeing rate has been obtained with many alcohols, partly soluble in water, whereas the lower, completely water-soluble alcohols have only a very small influence on the dyeing rate. The authors believe that other organic substances (eg, sparingly soluble amines and phenols) may also be effective in increasing the dyeing rate. They suggest that there are great possibilities for the dye manufacturers to modify their dyestuffs so as to be more suitable for water-solvent dyeing.—WHC

Interaction Between Chlorazol Sky Blue FF and Chrysophenine G in Aqueous Solution

Derbyshire, A N and Peters, R H, *J Soc Dyers Col* **72**, 268-77, June, 1956.

It is well known that the behavior of direct dyes when applied from a mixture is frequently very different from their behavior when dyed singly. This effect limits the usefulness of ordinary dyeing data when dyeing mixtures.

Other investigators have measured the equilibrium adsorption on cotton of various direct dyes in binary mixtures and their results show that the apparent affinities of the dyes for the fiber are considerably modified in mixtures. Of the dyes which were examined, the greatest change in adsorption value was found for the pair: Chlorazol Sky Blue FF (*CI* 518), and Chrysophenine G (*CI* 365). In the hope of obtaining more information about the mechanism of the process, this combination has been studied in greater detail by the authors.

The absorption spectra of mixtures of the two dyes were measured, both in aqueous solution and when dyed on Cellophane sheet. Paper chromatography measurements were also made on solutions containing varying proportions of the dyes as well as each dye alone.

The authors reached the conclusion that formation of a 1:1 complex of the two dyes occurs in aqueous solutions to an appreciable extent. This complex formation explains in a semi-quantitative way the change in dye adsorption compared with that of the same dyes when applied singly. It is very probable, they believe, that failure of the usual dyeing data on single dyes to predict the behavior of the same dyes in mixtures is due to interaction of this kind between the dyes in solution.

The paper is illustrated by graphs of various absorption spectra, and closes with nine references to the literature.—WHC

Teflon Tetrafluoroethylene Fiber

Rivers, J T and Franklin, R L, *Canadian Textile J*, **73**, #10, 56-8; #12, 50-3 (1956).

Teflon tetrafluoroethylene fiber, made by Du Pont, is a tough, highly oriented fiber possessing all the unique chemical inertness of the molded Teflon with which practically everyone in the engineering profession is familiar.

Since the Teflon molecules consist of long carbon chains with all available bonds completely saturated by fluorine, the molecules are electrically neutral, and there are no strong polar forces such as are so important in holding together the molecules of nylon, Dacron, or the cellulosic fibers. Instead, relatively weak but very numerous Van-der-Waals forces produce substantial intermolecular attraction.

The fiber has a "fantastic" resistance to chemical degradation. On one hand, the carbon-to-fluorine bonds are extremely strong; the only reagents that will break them are molten alkali metals. On the other hand, the fluorine atoms are packed so closely around the carbon chain that the carbon-to-carbon bonds in the chain are thoroughly protected from any reagent except fluorine gas at high temperature and pressure, or by chlorine trifluoride.

Thus, Teflon fiber is completely inert to such reagents as boiling sulfuric acid, fuming nitric acid, aqua regia, or boiling sodium hydroxide. It is inert to all the usual powerful oxidizing reagents. Moreover, Teflon fiber has no known solvents except certain perfluorinated organic liquids at above 570°F.

While Teflon fiber and fabric soften at elevated temperatures, even at 500°F there is still adequate strength available.

The fiber may be heat-set at 600°F, during which it shrinks about 12 percent. It is then practically unaffected by further heating up to 400-500°F.

In processing the Teflon continuous filament yarn through the various mill operations, including weaving, it is desirable to use a suitable sizing agent. A polyvinyl alcohol resin is recommended by the author.

To obtain the best white, the fiber should be treated with a mixture of concentrated sulfuric and nitric acids at an elevated temperature.

The author lists a number of suggested end-uses for Teflon fiber, including the following: filters for corrosive liquids, laundry fabrics, surgical bandages, conveyor belting, corrosion-resistant cordage, gaskets, and packings for chemical pumps.—WHC

Atmospheric Gas Fading of Dispersed Acetate Dyestuffs on Acetate Fabrics

Greyborn, A, *Canadian Textile J* **73**, 46-8, July 13, 1956.

The author first explains the chemical changes that take place in a typical anthraquinone blue disperse dye when subjected to atmospheric gas fumes. The change of shade to violet, then to red and finally to orange is due, he says, to the gradual conversion of methyl groups to hydroxyl.

The author then refers to the AATCC test equipment as described in the Association's Year Book, in which a six-months exposure to NO in the atmosphere can be duplicated in less than a day.

His objection to the standard AATCC test method is principally because it uses a Bunsen burner to produce the fumes for the fading. He states that the fuel gases used are not all the same, and the heat value and the pressure may vary, and as a result, it is difficult to check the end point.

He constructed an apparatus, which is described, in which nitrogen gases generated by chemical means were injected into a closed chamber. By the action of sulfuric acid on sodium nitrite, NO is formed, which oxidizes to N_2O_4 in contact with the air. A measured quantity of standardized acid is employed for each test, thus controlling the amount of gas released. In this apparatus the AATCC "Gas Fading Control No. 1" is faded uniformly to the shade of the AATCC "Standard of Fading" in 2½ hours, according to the author.

He states that there is a striking similarity between gas fading and light fading on both diacetate and triacetate, but the triacetate seems to be more sensitive to both light and gas. Nylon, however, is unaffected by the gas. This is an accepted fact in the industry, but the exact reason is unknown, he says.—WHC

Properties of Triacetate

Anon, *Man-made Textiles* **32**, #380, 49-50; #381, 54-55 (1956).

Triacetate fibers have a lower affinity for moisture and dyes than ordinary (secondary) acetate. This is because the long-chain molecules have greater symmetry than those of secondary acetate (since the side chains are all acetyl instead of a mixture of acetyl and hydroxyl) and

are packed together more closely in the fiber, thus hindering the penetration of moisture and dyes. This close packing of the molecules is indicated by the high melting point of the triacetate fiber, 300°C, which compares with a temperature of 225-250°C at which secondary acetate fibers simultaneously melt and decompose, and with the melting points of nylon (250°C) and Terylene (265°C).

Ordinary acetate and many synthetic fibers tend to contract considerably when heated to such high temperatures. By contrast, triacetate yarn shrinks only to a moderate degree (at 230°C secondary acetate shrinks 33% while triacetate shrinks only 7½%).

Triacetate fibers in their normal state are substantially noncrystalline, and their chain molecules are largely unoriented. When heated to just below the melting point, the structure becomes more regular and crystalline, and the moisture regain drops from 4.5% to 3.2%. Heat-treated fibers thus dry more quickly than untreated. The wet cross-sectional area swelling of untreated and heat-treated triacetate is 4.0 and 1.5%, respectively, compared with 8%, 25%, 42% and 65% for ordinary acetate, wool, cotton, and viscose rayon, respectively.

Ordinary acetate has good rot-resistance, but triacetate is stated to be even better in this respect.

Under normal dyeing conditions (70-80°C) triacetate dyes only one-half as rapidly as ordinary acetate. Unlike the latter, however, triacetate can be dyed at 100°C, and the dyeing can be further accelerated by the addition of substances that increase the solubility of the dye and also swell the fiber (eg, tripropyl and tributyl phosphates). The older "carriers" (eg, o-phenylphenol) can also be employed.

The author states that when dyed triacetate is heat-treated, the dyeing becomes faster to washing and light. There is, however, also a change of shade. Heat treatment also moderately increases the fastness of dyes to gas fading, fabrics acquire increased resistance to creasing, and permanent pleats can be produced.

He considers that triacetate is "a very attractive subject for research." —WHC

Dyeing Viscose Rayon Above 100°C

Cooke D, *Textile Mfr* **82**, 140-4, March, 1956.

There has been a steadily increasing interest in high-temperature dyeing since the war, ie, in dyeing textile fibers at temperatures above 100°C, and the idea is now well past the laboratory stage, as may be seen from the fact that most package-dyeing machinery manufacturers in Western Europe and America now manufacture bulk-scale package-dyeing equipment designed to be operated at temperatures above 100°C. High-temperature dyeing enables some of the newer man-made fibers, such as Terylene, to be dyed satisfactorily in commercially acceptable dyeing times. It also enables improvements to be made in the dyeing of the other man-made fibers, including viscose rayon, and some of the traditional fibers. These improvements include shorter dyeing times, simpler dyeing processes, and improved levelness and penetration.

As far as package dyeing is concerned, existing machinery has had to be modified to make it suitable for dyeing above 100°C. Modifications necessary included the following: the machines had to be completely closed to the atmosphere; they had to be more robustly constructed, to withstand the higher pressure; some system for making additions to the dyebath and for taking samples had to be devised; and safety valves had to be installed. Two main types of high-pressure package-dyeing machines now being made in England are the Steverlynck type and the Longclose type.

In examining the suitability of each class of dyestuffs for high-temperature dyeing, four factors must generally be considered:

1) The stability of the dyes (an adequate range of shades is required).
2) The stability of the fiber (its properties must not be significantly impaired).
3) The leveling properties of the dyes (the improvement above 100°C must be sufficient to show an advantage).
4) The fastness properties of the dyes (they must not be reduced).

Direct dyes applied to viscose at 120°C can be divided into three groups: 1) those that are stable when dyed either neutral or alkaline; 2) those that are stable when dyed neutral but unstable when dyed alkaline; 3) those that are unstable either way. Most direct dyes fall into Group 2).

When vat dyes are applied at 120°C, decomposition of the leuco compound may occur for various reasons, including the splitting off of chlorine from some dyes and the over-reduction of others. The author lists 21 anthraquinone vat dyes which are stated to be stable at this temperature. However, two important classes, browns and bright blues, are absent. Numerous substances have been proposed to minimize the damage caused by high temperatures (eg, dextrine and glucose), but the perfect protective has not yet been found.

The author states that vat dyes that are stable at 120°C have the same fastness to light, washing and chemic when so dyed as when dyed at normal temperatures.

Sulfur dyes are generally stable at high temperatures, and this process is therefore an advantage in respect of shorter dyeing times and improved results. Other dye classes are of little or no interest.—WHC.

A New Approach to High Temperature Dyeing

Bradshaw, S N *Man-made Textiles* **33**, 73-4, June, 1956.

The author describes recent experimental work in which molten urea was used as a dye transfer medium. He refers to the remarkable solvent properties of urea, which melts at 132.7°C. At this temperature it dissolves many organic compounds that are insoluble or only partly soluble in water. Urea is thus a solvent that can be used at temperatures much higher than the boiling point of water.

The most convenient method of using urea as a primary solvent, according to the author, was found to be the relatively simple technique of padding or otherwise impregnating the material with an aqueous solution of urea and dyestuff, and drying. Dye transfer is then effected by baking the material above the melting point of urea, preferably in the region of 140°C, after which the fabric is finished in the normal way. During the baking stage the urea melts, dissolves the dyestuff, and dye transfer is thus effected. A period of four minutes is sufficient, in most cases, to complete the dyeing.

This unusual method of dyeing appears to offer advantages in that tightly woven fabrics which are usually difficult to penetrate by conventional methods are rapidly dyed.

Disperse dyestuffs can be applied to both secondary acetate and triacetate by means of this method. Nylon can be dyed with disperse and metalized acid dyes. Terylene will take disperse dyes up to medium shades only. Apparently urea has little swelling action on this fiber.

Disadvantages of the process include the loss of solid material during the baking stage and the problem of migration of dye during drying. The author thinks, however, that it has wide possibilities, perhaps in the application of vat dyes, producing shades on acetate fast to gas fumes.—WHC

News of the Trade

Chemnyle Process

A variety of end products made of nylon, including half hose, taffeta, tricot and sweaters, "can be successfully dyed in fast color," according to Walter H Hindle, associate director in charge of textile research for the Chemstrand Corp.

The new process used in filament nylon dyeing, Mr Hindle said, "provides a previously unmatched combination of dyeing uniformity and colorfastness" to match the wearing qualities in filament nylon yarn.

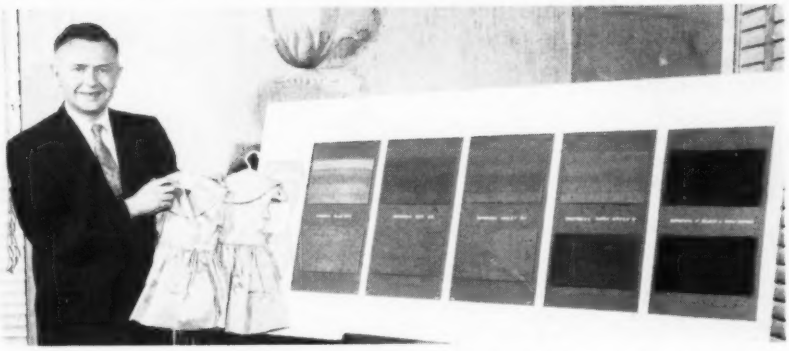
Named the "Chemnyle Process," the new dyeing method was developed by the Chemstrand Research Division at Decatur, Ala. Patent rights have been applied for on this process.

Speaking at a press conference held recently in New York, Mr Hindle said that the Chemstrand filament nylon dyed by the new technique, even when washed at 160° F and higher, has shown excellent resistance to color loss. Improvements in lightfastness are also substantial, he added.

The Chemstrand spokesman said the new method uses dye assistants to modify the application of existing acids and dyestuffs. He termed it adaptable to all forms of dyeing equipment.

With the "Chemnyle Process," Mr Hindle pointed out, the same uniformity of dyeing has been obtained on Chemstrand nylon as is normally encountered with disperse (acetate) dyestuffs but with the high fastness properties of acid and direct dyestuffs, particularly when aftertreated. Mr Hindle said that up until now filament nylon had been largely dyed with disperse dyestuffs in order to obtain uniformity of dyeing but that this had been done at the expense of good colorfastness. On the other hand, he continued, many acid and direct dyestuffs had given good colorfastness at the expense of uniformity of dyeing. "The net result," he pointed out, "was that for many years filament nylon fabrics, sweaters and hosiery which appeared on the market possessed a colorfastness which did not measure up to the longevity of the nylon yarn."

Commercially dyed fabrics and test results on fabrics dyed by the "Chemnyle Process" were exhibited at the press conference. The "Chemnyle" dyed goods showed resistance to 160 to 212 degree washing while conventionally dyed goods showed a very substantial loss of color. Mr Hindle said that tests of lightfastness similarly showed a substantial improvement.



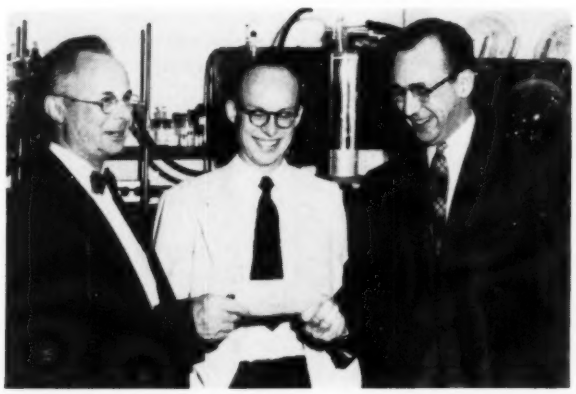
CHEMSTRAND'S CHEMNYLE PROCESS LAUNCHED—Results of the Chemstrand Corporation's new "Chemnyle Process" for filament nylon dyeing are displayed by Walter H Hindle, Chemstrand Textile Research Dept associate director, at a recent New York press conference announcing the new process.

Also shown at the press conference were samples of nylon fabrics containing a wide range of deliberately induced non-uniformities from both a physical and chemical standpoint. These showed that while a conventional acid or direct color dyeing process exaggerated these conditions, the same dyestuffs applied by the "Chemnyle Process" gave good uniformity.

The new dyeing development was a highlight of the Chemstrand exhibit at the recently concluded Perkin Centennial at the Waldorf-Astoria, New York.

It is reported that Chemstrand will license interested parties under a nominal fee, ranging possibly from $1 to $10. Chemstrand will offer the guidance of its technical people to assure the success of the new technique.

Mr Hindle said that the dyeing costs will not be substantially different from those experienced now.



Presenting a check for $1000 to Rutgers University is Zeno W Wicks, Jr, (right) general manager of the Interchemical Corporation's Central Research Laboratories. Accepting the check is P A van der Meulen, director of the University's School of Chemistry. The money will be used to purchase equipment for research involving Carbon 14, a radioactive isotope. Investigations will be carried out using C-14 to study reactions involving the rearrangement of the structure of organic compounds. A second phase of research will involve kinetic study in which an exchange reaction is carried out between C-14 compounds and nonradioactive substances. The project will be under the immediate supervision of Broderick A Barnes (center), associate professor of organic chemistry.

Conference on Man-made Fiber Progress

The Section of Physics and Chemistry of the New York Academy of Sciences has announced a Conference on Man-made Fiber Progress to be held Friday, October 12, 1956, at the Barbizon Plaza Hotel in New York.

The Conference program, organized by J J Press of the Polytechnic Institute of Brooklyn and the U S Navy Clothing Supply Office, will review new fiber developments and advances in fiber application. The speakers will include a number of the leading textile scientists. Interested scientists and technologists may obtain invitations and make reservations for the informal Subscription Luncheon by writing to Mrs Eunice Thomas Miner, executive director, New York Academy of Sciences, 2 East Sixty-third Street, New York 21, NY.

NCIT Changes Name

The National Council of Industrial Textiles, Inc, recently formed for the purpose of establishing a uniform identity and market place for the Industrial Textile Industry, has announced the change of name in its corporate title to Industrial Textiles Council, Inc.

M J Lovell, director of the organization, stated that he had received representations from the National Council of Textile Industries, that some confusion might result in the trade arising out of the claimed similarity of names of the two groups. After a conference and the demonstration of much cooperation and good will and expressions of mutual helpfulness, an agreement was reached.

Mr Lovell further stated that he has been conferring with industry leaders in the several branches of the Industrial Textiles Industry, which takes in all aspects of the textile industry, including the yarns and fibers, all the fabrics, the dyers and finishers, the chemical companies, the film and coated fabrics, the threads, machinery, etc, all of whose products and services enter into the ultimate products going to all manner of industry end users and manufacturers. He also stated that plans are progressing at a satisfactory pace for the industry-wide market week exhibit which will be held in New York at the Trade Show Building during the week of May 20th, 1957.

• NEW PRODUCTS •

Vinylmuls

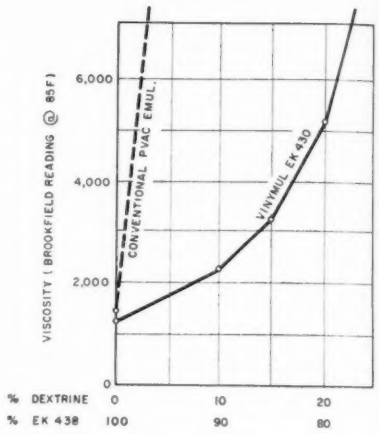
Increased plant capacity, special batch and semicontinous processing equipment and new techiques for producing both standard and specialized grades of polyvinyl acetate emulsions are making it possible for Paisley Products, Inc to offer custom polymers of vinyl acetate resin in aqueous dispersion in large quantities. Previously, Paisley and its parent, Morningstar, Nicol, used virtually all of its own production as a base for its adhesive and coating products, the requirements of affiliated plants throughout the country, and a few large users who have helped in the development.

Paisley can now deliver PVAc emulsions, which it calls Vinymuls, in amounts ranging from 5 gallons to carlots to meet customers' specifications.

The three most popular water dispersions of the resin at the present time are covered in the table.

Emulsions 2050 and 2230 are said to be especially useful for compounding into fast setting resin-based adhesives, where they reportedly exhibit stability to heat and light and wide compatibility with extenders, thickeners, and plasticizers. Emulsion EK-222 is of the free-filming type, and is commonly used for water-resistant coatings, textile finishes and as a vehicle for water-base paints. The fine particle size of this emulsion is said to permit rapid penetration of fabrics and compressed fibrous materials. This suits it especially for impregnation and sizing work. It is claimed excellent for spray applicaton.

A fourth emulsion, EK-438, has recently been developed for the gumming trade. This dextrine-compatible form will tolerate low or high soluble dextrines in all proportions, it is claimed. The dextrine can be added as a solution or cooked directly with the emulsion.



Test results (see chart) reportedly show how this emulsion can be blended with dextrine in large amounts without excessive buildup of viscosity. It is stated that conventional emulsion could not tolerate more than a few percent of dextrine and still maintain a smooth body. The dashed line on the graph suggests this incompatibility.

Paisley Vinymul emulsions can be supplied with total solids ranging from 40 percent to 60 percent, and the nonionic types are said to permit wide latitude in compounding. Common methods of compounding are the addition of solvents, plasticizers, or modifying agents such as other resins or dextrines. Frequently the emulsions are furnished already formulated with solvents, plasticizers or additives. Emulsions of small particle size have been developed for heat sealability. This attribute reportably contributes to better penetration in textile and paper finishing.

In textile processing a recent field report characterizes one emulsion as "useful in creating stiff, crisp, body building, wash resistant finishes which do not discolor, embrittle on aging or exposure to light and heat."

PAISLEY POLYVINYL-ACETATE EMULSIONS

	No. 2050	No. 2230	No. EK-222
Total solids	55% minimum	55% minimum	52%–55%
Weight per gallon	9.2 lb	9.2 lb	9.2 lb
Viscosity	1200–1500 cps	2500–3000 cps	1500–2500 cps
Particle size	1–5 micron	1–5 micron	0.5–1 micron
Water resistance	fair	fair	excellent
Ionic charge	nonionic	nonionic	anionic
pH	4.5–5.5	4.5–5.5	4.5–5.5
Film	cloudy-dull	cloudy-dull	clear-glossy
Free monomer	0.5 maximum	0.5 maximum	0.5 maximum

Upholstery backfilling and fabric finishing are reported as popular uses for the more water-resistant grades. A December 1955 analysis lists these attributes: 1) adaptable to wet processing, 2) stability in storage over long periods and during mechanical agitation, 3) high solids at workable fluidity, 4) colorless and continuous film, 5) excellent adhesion to natural and synthetic fibers, 6) nonchlorine retentive (particularly important with cotton), 7) thermoplastic (useful in setting to forms and in embossing), 8) requires no curing, 9) modifiable with plasticizers to yield almost any degree of flexibility, 10) improved sunlight and temperature resistance, 11) compatibility with starches, gums, other resins, dyes and commonly used finishing agents, and 12) resistant to alkalies, acids, oils and greases. This observer concludes that "man-made resins are a relatively new development for the textile finisher, a forward trend supplementing the improvements in starch, gelatine and natural gums used in finishing and sizing formations."

Acrysol ASE-60

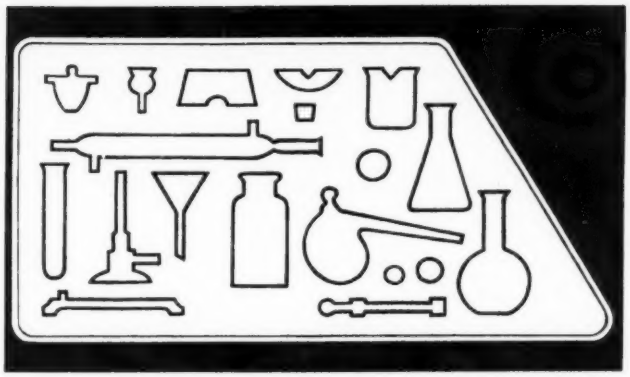
A new acrylic thickening agent developed by Rohm & Haas Company is said to form salt solutions similar to those of natural gums or water-soluble cellulose derivatives and at the same time offer high thickening power, ease of handling and low cost.

Acrysol ASE-60, an acid-containing, crosslinked acrylic emulsion copolymer, is supplied as a milky liquid with a viscosity of 4.0 centipoises and a solids content to 28 percent. Diluted with water to not more than 5 percent total solids and neutralized instantaneously with any one of a variety of standard bases, it clarifies and becomes highly viscous.

Suggested textile uses center around viscosity adjustment of emulsion and latex compounds of many types, particularly thermoplastic latices such as those formed from Rhoplex acrylic resins. Storage-stable, the thickener is said to prove particularly efficient in compounds of low total solids or where the system is highly stabilized.

Frequently the thin emulsion of unneutralized Acrysol ASE-60 may be incorporated into a latex, emulsion or other suspension and then thickened "in situ." Addition of alkali should raise the pH of the system from 3.5 of the emulsion as supplied to a final pH greater than 7.5.

Salts of Acrysol ASE-60 have no flocculating action, thickened latices are free of any creaming tendency, and aqueous suspensions throw down no sediment, it is claimed.



C-Thru Ruler Chemistry Stencil

Chemistry Stencil

A new chemistry stencil, introduced by The C-Thru Ruler Company, 873 Windsor St, Hartford, Conn, has cutouts of bunsen burners, beakers, flasks, test tubes, retorts, etc. The outer edges of the stencil form angles for use in drawing bent delivery tubes.

Made of sturdy, clear plastic, the stencil makes it possible to neatly, accurately and quickly draw the various items. It is a convenient template for use in classrooms and in laboratories for professional chemists and physicists.

They are packed one dozen to a box and three dozen to a box, and are made to retail at 20¢ each.

• TECHNICAL LITERATURE •

EMPOL 1022 POYMERIZED FATTY ACID—*Emery Industries, Inc, Dept 5, Carew Tower, Cincinnati 2, O*—In addition to a complete description, specifications, characteristics and shipping data on Empol 1022, this 20-page booklet contains considerable application data in many fields.

A complete end-use bibliography completes the material presented.

G-4® (DICHLOROPHENE)—AN ANNOTATED BIBLIOGRAPHY — *Sindar Corp, 330 West 42nd St, New York 36, N Y*—A complete revised comprehensive bibliography of the literature on G-4® (Dichlorophene). The bibliography, Technical Bulletin D-2, contains abstracts of some 109 scientific trade articles, as well as abstracts of 12 patents both foreign, and domestic.

Technical Bulletin D-2 has been indexed so that any abstract on a given subject can be easily located. The index is divided into seven major categories including: Biological Properties, Compatibility, Patents, Physical and Chemical Properties, Test Methods, Toxicological Properties and Uses. These categories are further subdivided to give the reader easy access to any particular subject of interest.

MONOMER HEADQUARTERS FOR THE RESIN INDUSTRY—*Carbide and Carbon Chemicals Co, 30 East 42nd St, New York 17, NY*—Folder F-04033 gives important physical properties and suggested uses for 36 monomers that are available from Carbide in commercial, development, and research quantities. Polymers and copolymers prepared from these monomeric compounds are used in the manufacture of textile finishes, synthetic fibers, etc. In addition, these compounds are reactive intermediates for the synthesis of many useful materials, such as, dyestuffs, insecticides, etc.

WOOL FELT FILTRATION OF LIQUIDS—*American Felt Co, Glenville, Conn*—This 10-page data sheet sets forth the advantages of wool felt for liquid filtration, based on American Felt's entire range of wool filter felts.

The data sheet is the 17th in a series describing the end uses of American Felt products and explains with charts and diagrams the properties and characteristics which make wool felt filters desirable. The standard line of liquid filter felts presented in the data sheet is declared to provide efficient and economical filter media for cellulose nitrate, solvents, hot lubricating oil, paint, latex, water, food syrups and oils.

A table in the data sheet shows the physical properties and performance characteristics of wool felt while two charts correlate air or liquid flow rates for filtration of fluids of a known viscosity and the characteristic flow rates for felt and fluids of various viscosities.

American Felt Company is also in production on the full range of synthetic fiber filter felts for general and specific commercial applications. These synthetic fiber filter felts are said to be highly acid- or alkaline-resistant and to possess all the chemical and thermal properties specific to the various synthetic polymer fibers used. Technical Fact Sheets are available upon request.

• NAMES IN THE NEWS •

Dhonau

McDermott

Connelly

Wojcik

Young

Robert H Dhonau and **Arthur R McDermott** have been added to the staff of the Development and Service Department of Emery Industries, Inc. They will be concerned with the development of all new Emery products as well as technical service for both the Fatty Acid and Organic Chemicals Sales Departments. Mr McDermott previously handled the sale of Emery's industrial chemicals, first in the Chicago area and then in the southwestern states. Mr Dhonau has been a member of the Applications Research Group of Emery's Research Laboratories for the past 10 years.

Robert F Connelly has been assigned as the West Coast field salesman for Emery's Organic Chemical Sales Dept. Prior to joining Emery, he was associated with the Bray Oil Company in a research and development capacity.

Robert C Bokum, head of the Business Administration Department of the Philadelphia Textile Institute, was recently appointed acting head for the new four-year degree curriculum with a major in textile management and marketing.

Mr Bokum is relinquishing his duties as director of Evening School in order to devote a large part of his time to the development of the new course.

All research activities in the Industrial Chemicals Division of Olin Mathieson Chemical Corp have been combined under the direction of **Bruno H Wojcik,** who has been named manager of research and development for the division. Dr Wojcik will be located in Baltimore.

Dr Wojcik came to Olin Mathieson in 1950 from the Hooker Electrochemical Company, Niagara Falls.

In addition, **Bernard H Nicolaisen** has been appointed assistant manager of research and development in charge of the division's laboratories at Niagara Falls, NY, and **Chester White** will supervise the Rochester, NY, laboratories, formerly the Genesee Research Corporation.

Recent scholarship winners at the School of Textiles, North Carolina State College, include:

Harold A Wagner—$400; American Enka Corp Scholarship

Alvin L Potts, Kenneth F Stout, and **Charles W Hammer**—$333.33 each; Shapiro Foundation Scholarships

John W Copeland—$500, American Viscose Corp Scholarship

Larry S Buff, Duncan D Chappell, and **Eddie M Barringer**—$500 each; The Herman Cone Family Foundation, Inc, Scholarships

Victor H Garrou—$500; Blackman-Uhler Scholarship

William A Underwood, III—$400; Jack Goldfarb Scholarship

Arthur E Young, assistant manager of The Dow Chemical Company Plastics Department, has been named manager of the company's new Textile Fibers Department.

For the past 8 months Mr Young has been coordinating the Dow team that developed Zefran staple fiber through pilot-plant production.

A plant to manufacture Zefran will be built by Dow near Lee Hall, Virginia. For the present, Mr Young will keep his office at Dow headquarters in Midland, Mich.

Others named to key posts in the new department include:

H E Beeman, accountant in the Advertising Department, who will be controller.

J R Hodge, Jr, assistant manager of labor relations for the Midland Division, who will be in charge of industrial relations at the Virginia plant.

Samuel G Ludington, former assistant chief engineer of the Midland Division, who will be in charge of engineering and maintenance.

O R McIntire, former assistant director of the Polychemicals Research Department, who will be technical director.

James F O'Donnell, section head in Plastics Technical Service, who will be in charge of textile development.

G W Stanton, research group leader in the Western Division at Pittsburg, California, who will be in charge of research.

General Calendar

AMERICAN ASSOCIATION FOR TEXTILE TECHNOLOGY, INC
Oct 3, Nov 7, Dec 5 (All meetings at the Vanderbilt Hotel, New York, N Y).

AMERICAN CHEMICAL SOCIETY (CLEVELAND AND CHICAGO SECTIONS)
Nov 27-30 (9th National Chemical Exposition, Cleveland Public Auditorium Cleveland, Ohio).

AMERICAN OIL CHEMISTS SOCIETY
Spring, 1957 (Spring meeting, New Orleans); Sept 30-Oct 2, 1957 (Fall meeting, Cincinnati); Apr 21-23, 1958 (Memphis); Oct 20-22, 1958 (Chicago); Spring, 1959 (New Orleans); Fall, 1959 (Los Angeles).

AMERICAN SOCIETY FOR TESTING MATERIALS
Oct 16-19—Fall Meeting of Committee D-13 on Textiles, Warwick Hotel, New York, N. Y.

THE DRYSALTERS CLUB OF NEW ENGLAND
Oct 26 (Hotel Vendome, Boston); Jan 21 (Hotel Somerset, Boston); Apr 26 (Hotel Vendome, Boston); June 21 (Annual Outing—Wachusett Country Club, West Boylston, Mass).

THE FIBER SOCIETY
Spring Meeting—May 1-2, 1957, The Clemson House, Clemson S C

NATIONAL COTTON COUNCIL OF AMERICA
October 3-4 (Chemical Finishing Conference, Hotel Statler, Washington, DC); Feb 28-Mar 1 (Cotton Research Clinic, General Oglethorpe Hotel, Savannah, Ga).

THE QUARTERMASTER ASSOCIATION
Annual Convention — Oct 27-28, Conrad Hilton Hotel, Chicago, Ill.

SOUTHERN TEXTILE EXPOSITION
19th Exposition, Oct 1-5, Textile Hall, Greenville, S C.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Oct 9, Nov 7 (Palm Terrace Suite, Hotel Roosevelt, New York, N Y).

TEXTILE QUALITY CONTROL ASSOCIATION
September 27-28—Fall Meeting, Sedgefield Inn, Greensboro, NC

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